REVIEW OF THE CITY OF LAKE FOREST FINAL REPORT FOR THE 1995 BEACH AND NEARSHORE MONITORING PROGRAM, FOREST PARK BEACH, LAKE FOREST, ILLINOIS

Michael J. Chrzastowski and C. Brian Trask

Illinois State Geological Survey
Coastal and Wetlands Geology Section
615 East Peabody Drive
Champaign, Illinois 61820-6964

July 1996

Submitted to:

Illinois Department of Natural Resources
Office of Water Resources
310 South Michigan Avenue, Room 1606
Chicago, Illinois 60604

Final Report For Project No.: WR-09118/SRA-190

Illinois State Geological Survey
Open File Series 1996-6

DATE DUE			

Chrzastowski, Michael J.
REVIEW OF THE CITY OF
LAKE FOREST FINAL
REPORT FOR THE 1995
BEACH AND NEARSHORE

REVIEW OF THE CITY OF LAKE FOREST FINAL REPORT FOR THE 1995 BEACH AND NEARSHORE MONITORING PROGRAM, FOREST PARK BEACH, LAKE FOREST, ILLINOIS

Michael J. Chrzastowski and C. Brian Trask

Illinois State Geological Survey
Coastal and Wetlands Geology Section
615 East Peabody Drive
Champaign, Illinois 61820-6964

July 1996

Submitted to:

Illinois Department of Natural Resources
Office of Water Resources
310 South Michigan Avenue, Room 1606
Chicago, Illinois 60604

Final Report For Project No.: WR-09118/SRA-190

Illinois State Geological Survey
Open File Series 1996-6

EXECUTIVE SUMMARY

Beach and nearshore morphology was monitored at Forest Park Beach, Lake Forest, Illinois in the summer of 1995 as part of the fifth and final year of a five-year monitoring program. The responsibility of annually collecting and presenting survey data for five years rested with the City of Lake Forest. The Illinois State Geological Survey (ISGS) independently collected and summarized data to provide a check on the work by the City and to contribute supplemental data and interpretation. The ISGS participation in this coastal monitoring program was partially supported under a contractual agreement with the Illinois Department of Natural Resources Office of Water Resources (formerly Illinois Department of Transportation Division of Water Resources).

During the 1995 coastal monitoring, the ISGS collected profile data in June, corresponding generally to the time of the City's profiling. A total of 28 of the City's profiles were run, consisting of (1) the 15 long lines of the monitoring plan approved by the permitting agencies, (2) four lines added in 1992 at the discretion of the ISGS for additional areal coverage, and (3) nine beach-cell lines, comprising two lines in each of the four beach cells and one additional line in Beach Cell 4. Comparison of the ISGS profile data with the data collected by the City of Lake Forest verifies the reproducibility of the City's prism-pole data. However, the City's fathometer data consistently record shallower depths, generally in the range of 0.75 to 0.8 ft (0.2-0.25 m). In addition, the ISGS ran eight supplemental profiles in the boat-launch basin in June 1995 and again in April 1996. The purpose of these profiles was to document the amount of sand trapped in the basin between the 1995 and 1996 dredging operations.

Comparison of 1994 and 1995 topographic and bathymetric data indicates that the dominant process during the 1994-1995 period was erosion. Accretion occurred locally in the updrift nearshore zone, in Beach Cells 2 and 3, marginal to each of the breakwaters, south of both Breakwater I and the entrance to the boat-launch basin, and in the groin field south of the project. Erosion occurred in all of the beach cells, lakeward of the breakwaters and Beach Cell 4, and at the lakeward edge of the riprap at the south end of the project. The maximum thickness changes for accretion and erosion were on the order of 2 to 3 ft (0.6 to 0.9 m). Despite erosion dominating the 1994-1995 monitoring year, the position of the sand/clay interface remained essentially unchanged.

Volumetric analyses of beach and lake-bottom accretion and erosion between 1994 and 1995 were conducted by the ISGS and by a consultant for the City (W.F. Baird & Associates, Ltd.). Both used a computer-assisted comparison of bathymetric data from these two years. There is some variation between the two analyses because some factors in the computations differed (e.g., slightly different areal boundaries were used for the calculations). In general, however, agreement was fairly good, and thus the values reported by the consultant are considered a reasonable representation of net volumetric changes in the monitoring area between 1994 and 1995. For changes landward of the sand/clay interface (the ISGS used the 15-ft contour), and not including the area between profiles N6550 and N5617, the ISGS reported a net erosion change of 15,600 cu yd (11,900 cu m), while the City reported a net change of 18,800 cu yd (14,400 cu m) of erosion. This change uses a 0-ft threshold for all accretion and erosion computations; this level of detail is possible because of the accuracy of the 1994 and 1995 total-station data.

The City's calculation of volumetric change ignores the area lakeward of Breakwater I and lakeward of the southern revetment for which the City did not collect data prior to 1994 (between profiles N6550 and N5617). For this area, ISGS data indicate that net erosion occurred in 1994-1995 (7,600 cu yd [5,800 cu m]). Thus, for the entire monitoring area, ISGS data indicate the 1994-1995 net change was approximately 23,200 cu yd (17,700 cu m) of erosion.

This is the largest single-year net erosion to be documented in the five-year monitoring program and follows the 1993-1994 record of the largest single-year net accretion. These results show that wide, annual fluctuations in accretion and erosion can occur within the monitoring area. These accretional changes may not be a permanent addition to the beaches or lake bottom. Thus, to fully evaluate beach and lake-bottom changes in the vicinity of Forest Park Beach, the long-term record of change is important.

Comparison of the June 1995 and April 1996 boat-basin surveys reveals a pattern of erosion on the west side of the basin and accretion on the east side, suggesting a clockwise current gyre in the basin. Net change within the basin was accretion of 3,240 cu yd (2,480 cu m). Annual dredging of the boat-launch basin began in 1988. From 1988 through 1995, the dredging totaled 22,440 cu yds (17,200 cu m) for a seven-year average annual dredging of 3,206 cu yd (2,451 cu m). It is assumed that this sand is derived from natural southward bypass of the breakwaters caused by northeasterly waves and subsequent transfer of some of this sediment into the boat-launch basin by southeasterly waves. Because the sediment dredged is disposed of in the downdrift nearshore, the basin entrapment has not caused any net loss to the volume of sand in the littoral stream.

The completion of the fifth and final year of this five-year monitoring program (1991-1995), combined with data from an earlier monitoring program (1987-1989), allows an evaluation of all beach and nearshore changes for the first eight years following construction (1987-1995). Since completion, Forest Park Beach has acted as a partial barrier to net southward littoral transport. The primary coastal change between 1987 and 1995 has been net accretion updrift of the facility, on the beaches, in the beach cells, and along the lakeward perimeter of the facility as far south as the entrance to the boat-launch basin. Net erosion has occurred across the nearshore south of the boat-launch basin. Natural bypass of the facility began at least by 1988, which was one year following construction. With time, additional accretion on the lakeward perimeter improved the sand bridge for natural bypass.

Based on an ISGS evaluation of net change between 1987 and 1995 (using a 1-ft threshold for changes between 1987 and 1992 and a 0-ft threshold between 1992 and 1995), the net change in the monitoring area has been accretion totaling 45,800 cu yd (35,000 cu m). From 1991 through 1993, the City of Lake Forest provided 10,000 cu yd (7,600 cu m) of nourishment to the downdrift side of Forest Park Beach. Subtracting this volume from the total accretion volume, the adjusted net impact of the facility in terms of beach and nearshore accretion as of 1995 is 35,800 cu yd (27,400 cu m).

The net accretion at Forest Park Beach is greater than was predicted based on a pre-construction understanding of the volume of littoral sediment in transport passing the project site. It was believed that a major factor inhibiting littoral sediment supply from updrift was the harbor at Great Lakes Naval Training Center located 3.5 miles (5.6 km) updrift, which was considered a near-total barrier to littoral transport. Long-term (1872-1995) coastal processes updrift of Lake Forest were recently analyzed by the ISGS for the U. S. Army Corps of Engineers Interim IV Study of lakeshore accretion and erosion between Waukegan Harbor and Wilmette Harbor. This work by ISGS documented that natural bypass of Great Lakes Harbor has occurred since at least 1974. Artificial bypass of sand dredged from Waukegan Harbor has occurred consistently since 1984. Thus without Great Lakes Harbor acting as a place of major entrapment, Forest Park Beach has become the first significant partial barrier to littoral transport of sand dredged and artificially bypassed at Waukegan Harbor.

CONTENTS

APPENDICES

FIGURES

TABLES

PLATE

INTRODUCTION

This report is the fifth in a series of five annual reports prepared by the Illinois State Geological Survey (ISGS) concerning annual monitoring of beach and nearshore morphology at Forest Park Beach on the shore of Lake Michigan at Lake Forest, Illinois (fig. 1).

Forest Park Beach is a lakeshore park and beach facility built by the City of Lake Forest. Construction was completed in 1987. This 22-acre (8.9-hectare) facility consists of six rubble-mound breakwaters, four beach cells, a boat-launch basin, parking, walkways, beach houses, and park land (fig. 2). Forest Park Beach was constructed primarily to provide shore defense and to stabilize the City's lakeshore park land, and secondarily to provide lakeshore recreation (Anglin et al. 1987).

Permits for construction of Forest Park Beach were issued by the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR) and by the Chicago District of the U.S. Army Corps of Engineers. These permits required that, following completion of construction, a three-year annual monitoring program be conducted by the City of Lake Forest to document any changes to the beach and nearshore caused by the project. Of primary concern was the potential entrapment of littoral sediment against the north (updrift) side of the project and the resulting deprivation of littoral sediment leading to possible erosion along the shore to the south (downdrift) of the project.

One of the recommendations presented in the summary report for the three-year monitoring program was to continue the monitoring for another five years (Lake Forest Shoreline Monitoring Committee 1990a). As part of this new monitoring program, IDOT-DWR contracted with the ISGS to evaluate the data collection and gather independent data for comparison and validation of the data collected by the City of Lake Forest and its consultants. All requirements for the annual monitoring were defined by the Chicago District, U.S. Army Corps of Engineers. As of July 1, 1995, due to a consolidation of Illinois government agencies, IDOT-DWR became part of the newly formed Illinois Department of Natural Resources (DNR) and was renamed the Office of Water Resources.

Summary of Annual Monitoring

Year-1 (1991) In the first year of this new annual monitoring program, data were collected for the City of Lake Forest by a survey team from the Bellevue, Washington, offices of the consulting firm CH2M HILL. The technical report for the 1991 monitoring (CH2M HILL 1992) was reviewed and the data collection validated by the ISGS (Chrzastowski and Trask 1992).

Year-2 (1992) The second-year monitoring differed from the first year in that the City of Lake Forest did the majority of data collection and data processing. The engineering firm Manhard Consulting Ltd. of Vernon Hills, Illinois, was contracted by the City to establish all horizontal control and to collect data on offshore positioning. The firm Hydrographic Survey Inc. of Chicago was contracted to provide diver-obtained data on the location of the sand/clay interface within the limits of the monitoring project and to determine if any lake-bottom erosion had occurred at 12 reference stakes set in 1991. The report summarizing the 1992 annual monitoring was completed by the City of Lake Forest in March 1993 (Magnus 1993a). A supplement to the final report, which provided volumetric calculations of 1988-1992 accretion and erosion, was completed in August 1993 (Baird & Associates 1993a). The technical report for the 1992 monitoring was reviewed and the data collection validated by the ISGS (Trask and Chrzastowski 1993).

Year-3 (1993) The third-year monitoring at Forest Park Beach was conducted in a similar manner as the second year, with the City of Lake Forest primarily doing the data collection and processing with assistance from the engineering firm Manhard Consulting Ltd. (Magnus 1993b). Calculations of accretion and erosion were conducted for the interval from 1992 to 1993 (Baird & Associates 1993b). The technical report for the 1993 monitoring was reviewed and the data collection validated by the ISGS (Chrzastowski and Trask 1994).

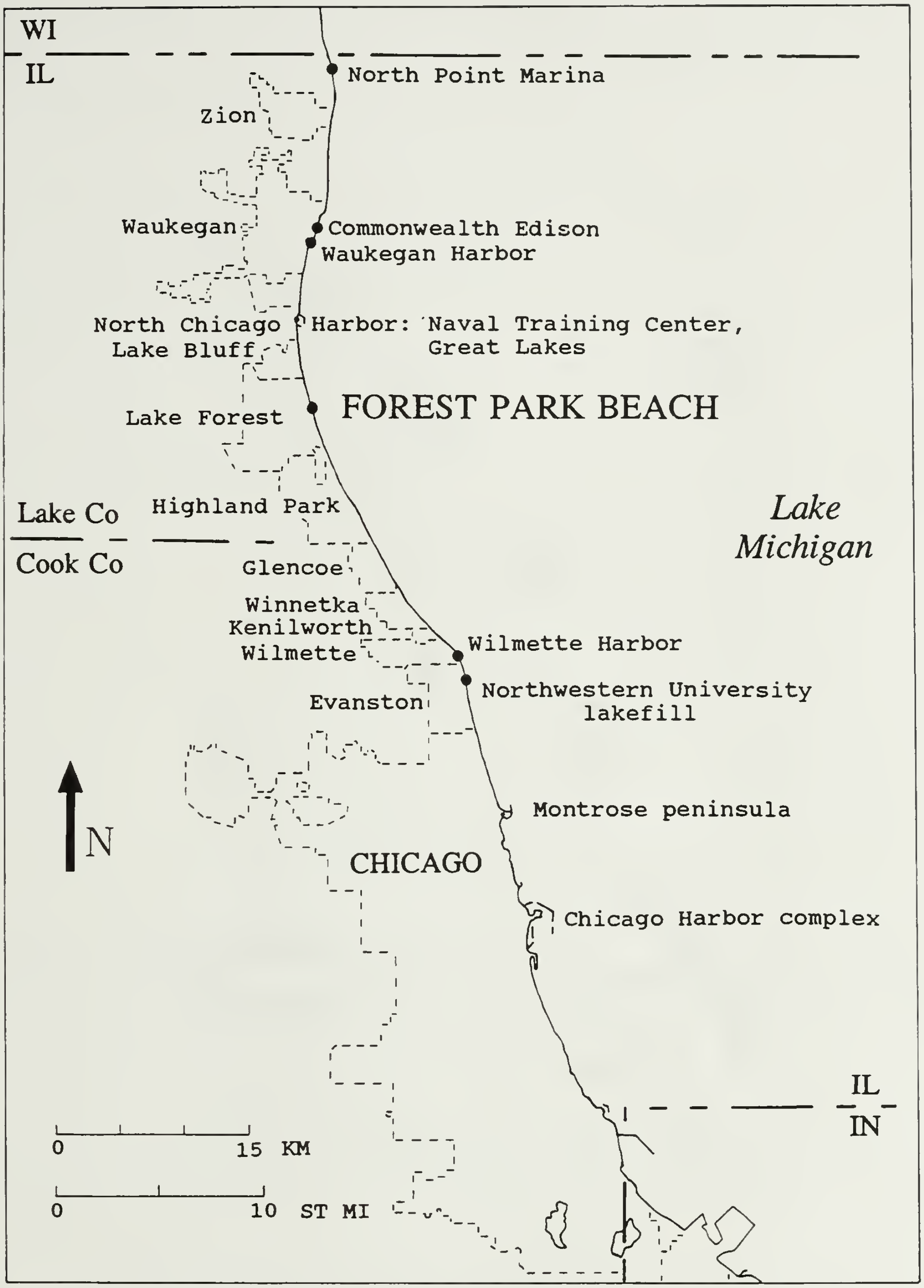


Figure 1 Illinois shore of Lake Michigan showing the location of Forest Park Beach and other major engineered structures along the northern Illinois coast.

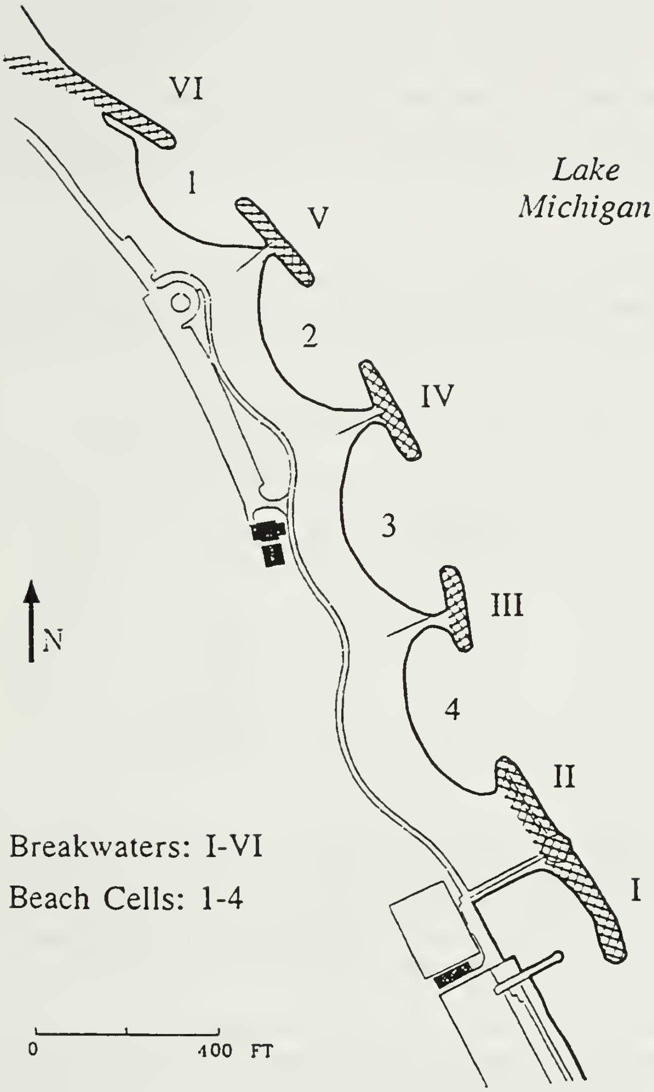


Figure 2 Numerical designation used for the six breakwaters (Roman numerals; south to north) and the four beach cells (Arabic numerals; north to south) at Forest Park Beach.

Year-4 (1994) The fourth-year monitoring program at Forest Park Beach was conducted in a similar manner to the third year. The City of Lake Forest performed the data collection and processing, and Manhard Consulting Ltd. assisted. Diver survey tasks were carried out by Hydrographic Survey Company, while volumetric analysis of accretion and erosion was performed by W.F. Baird & Associates Ltd. The technical report for the 1994 monitoring (Magnus et al. 1994) was reviewed and data collection validated by ISGS (Trask and Chrzastowski 1995).

Year-5 (1995) In the fifth year monitoring, procedures were generally the same as in years two (1992), three (1993), and four (1994). Again Manhard Consulting Ltd. was involved in the City of Lake Forest data collection. Hydrographic Survey Company was contracted to collect fathometer data along profile lines. The City was first required to collect such fathometer data in the first year of monitoring (1991) and to repeat the data collection in this fifth year (1995). Diver survey tasks were also carried out by Hydrographic Survey Company. Volumetric analysis of accretion and erosion was again performed by W.F. Baird & Associates Ltd. The technical report for the 1995 monitoring (Magnus et al. 1996) is the subject of review and data validation of this report.

Units of Measure
Both U.S. customary (i.e., English) and metric units are used in this report. Primary reference in the text is to U.S. customary units, with metric equivalents given in parentheses. Abbreviations for units are used throughout the text. Table 1 gives the various units of measure and the abbreviations used in this report.

Table 1 Abbreviations for U.S. customary and metric units.

Unit	Abbreviation
foot	ft
cubic yard	cu yd
mile	mi
meter	m
cubic meter	cu m
kilometer	km

Purpose and Scope
The role of the ISGS in the coastal monitoring program at Forest Park Beach is that of a scientific and technical reviewer of the data collection, processing, and reporting by the City of Lake Forest. As part of this role as a scientific and technical reviewer, the ISGS is responsible for independently collecting monitoring data and making field observations within the monitoring area at Forest Park Beach for comparison with the data collected by the City and its consultants.

For the Forest Park Beach monitoring program, the ISGS is under contractual obligation to Illinois DNR Office of Water Resources, the state agency responsible for regulatory functions along the nearshore and offshore zone of the Illinois coast of Lake Michigan. As part of its program to assure proper coastal management and mitigation, DNR Office of Water Resources has specific interest in the quality of the Forest Park Beach monitoring program.

The scope of work for the ISGS has essentially been the same for all five years of this five-year program. The specific scope for 1995 was as follows.

- Observe and document the 1995 data collection by the City of Lake Forest and independently repeat selected profile lines for comparison.

- Review the adequacy of the annual report prepared by the City of Lake Forest for the 1995 monitoring and summarize this review in a report to DNR Office of Water Resources.

- Collect profile data along all 15 of the so-called "long-profile lines," which are profile lines extending to approximately 2,600 ft (800 m) offshore, as outlined in the initial monitoring requirements for the five-year monitoring program.

- Incorporate and archive all data collected by the ISGS into the existing ISGS database on coastal geology and geomorphology for the Illinois coast of Lake Michigan.

At the discretion of the ISGS, and as an addition to the regular field work in June 1995, a bathymetric survey was done by ISGS within the boat-launch basin and at the approach to the basin. Lake-bottom accretion trends in 1993 and 1994 indicated that this basin was becoming a significant sediment trap. Annual dredging requirements for the basin confirm this trend of increasing entrapment volumes. The survey in June 1995 was done as a baseline survey for an annual comparison of accretion volumes. The June 1995 survey was performed after the 1995 maintenance dredging. A corresponding survey was done in April 1996 before the 1996 maintenance dredging. This report on the 1995 monitoring includes a discussion of sediment volume changes within the boat-launch basin between June 1995 and April 1996.

PART 1: DATA COLLECTION AND PRESENTATION

ISGS FIELD PROCEDURES

Fathometer Survey Procedures

Lake-bottom profiling by fathometer was conducted in the same manner as that done by the ISGS during the 1991, 1992, 1993, and 1994 monitoring. In addition, the same equipment was employed as was used in 1991, 1992, 1993, and 1994. Photocopies of the original fathometer traces are located in Appendix A.

Collection of fathometer data required a three-person team—two persons in a survey boat and one person onshore. The boat was a 12.5-ft (3.8-m) "Zodiac-type" inflatable having a 9.9-horsepower outboard motor. The ISGS report for the 1994 monitoring includes a photograph of the ISGS survey boat (Trask and Chrzastowski 1994, fig. 4). The onboard fathometer was a Ross Model 803 Portable Survey Fathometer[1] with a 100-kiloHertz (kHz) transducer. The transducer was mounted over the port side of the boat with a 0.5-ft (0.15-m) transducer depth. Transducer depth is not a factor in reading the fathometer traces because the Ross Model 803 fathometer has an adjustment that allows compensation for this depth. At the beginning of each survey day, calibration of the fathometer was verified with a bar check by lowering a steel grate below the transducer and producing a fathometer record at 1-ft (0.3-m) intervals from 2 to 12 ft (0.6 to 3.7 m); calibration was also verified by comparison with depths obtained by lowering a stadia rod to the lake floor and noting the level of the lake surface on the rod.

Position control for the fathometer surveys was by a range/azimuth technique. The onshore field assistant used a surveyor's transit positioned over the control point for the profile line that had been surveyed and marked by the City of Lake Forest's consultant. The transit was oriented along the azimuth of the profile line. As the survey boat advanced toward shore, the transit operator gave radio calls or visual signals to the boat operator to keep the boat within one boat width (5.6 ft [1.7 m]) of the profile line (i.e., the transit center line). Approximate boat speed during profiling ranged from 2 to 3 knots (3 to 5 ft/s [0.9 to 1.5 m/s]).

Offshore distance to the survey boat was measured using a Motorola Mini-Ranger III system. The Mini-Ranger measures distance in meters by calculating the travel time of a microwave signal between a transceiver and transponder. The transceiver and console were aboard the survey boat; the transponder

---

[1]Note: Use of specific product names in this report is for informational purposes only and does not constitute endorsement by the Illinois State Geological Survey.

was onshore, placed at a known location on the profile line, usually beneath the transit at the profile control point. The fathometer operator monitored the digital display of distance on the Mini-Ranger console and made an event mark on the fathometer trace at 10-m (32.8-ft) intervals. For reference, a bolder mark was made at 50-m (164-ft) intervals by slightly longer depression of the event button (see Appendix A). Profile start time was noted to permit water-level corrections during data processing. Profiles began offshore at a distance of 800 to 900 m (2,625 to 2,950 ft) and continued toward shore to a water depth of about 2 ft (0.6 m). In order to acquire a continuous onshore to offshore profile, beach and nearshore profiling with a total station and prism pole (see Prism-Pole Surveys) was conducted as a continuation for each of the fathometer lines and overlapped the fathometer lines for a distance of 2 to 148 ft (0.6 to 45 m). An exception occurs at some breakwaters or riprap, where it was not always possible to overlap the two data-collection procedures.

The manufacturer states that the accuracy of the Mini-Ranger III system is ±3 m (±9.8 ft). The system has a maximum range of 37 km (22 mi). The Mini-Ranger used in this study was capable of operating to a minimum distance of 10 m (32.8 ft) between the transponder and transceiver.

Fathometer Survey Coverage

The 1995 fathometer surveys by the ISGS covered all of the so-called "long profiles" or “long lines” established in 1991 by CH2M HILL for this five-year monitoring program (fig. 3). In 1995, fathometer data were also collected along these long lines for the City of Lake Forest by Hydrographic Survey Company. Besides the long lines, ISGS also collected fathometer data along each of two lines centered on each of the four beach cells. These fathometer profiles were gathered to enable comparison of these data with data from the City of Lake Forest along survey lines that extend lakeward of the breakwaters. Fathometer data were collected along one additional line in Beach Cell 4. For consistency with the other fathometer profiles collected on the north and south sides of the project, the beach-cell fathometer lines were extended offshore to 800-900 m (2,625-2,950 ft).

In the 1992 monitoring, the ISGS added four long lines to the survey scheme at a 200-ft (61-m) line spacing northward from line N5617. These four additional lines (N5817, N6017, N6217, and N6417) were added to provide lake-bottom data lakeward of Breakwater I at the boat-launch basin and lakeward of the riprap-defended shore south of this basin. Sand bypassing the facility eventually has to cross this section of lake bottom. In 1992 and 1993, these lines were run solely by the ISGS. In 1994 and 1995, these lines were run by both the ISGS and the City of Lake Forest. One additional long line was added by ISGS in 1994 and repeated in 1995. This is line N6700 which crosses Breakwater II. This is a designated short line, but fathometer data were collected by ISGS in order to achieve more uniform spacing within the data set of long lines.

In total, fathometer data were collected by the ISGS along 28 profile lines (this does not include 8 lines added for a survey at and near the boat launch basin). Figure 3 shows the locations and designations of these fathometer profiles. On the landward end of each fathometer profile, there is overlap with profile data collected by wading in the nearshore with a prism pole, except for a few locations where overlap was not possible (such as on the lakeward margins of breakwaters).

The City of Lake Forest surveyed a total of 70 profiles (so called “short lines”) for a distance of 800 ft (244 m) lakeward of the E2000 baseline (fig. 4). In addition, for the City of Lake Forest, Hydrographic Survey Company collected fathometer data along all of the required long lines. Figure 4 shows the locations and designations of the short lines run by the City of Lake Forest. Figure 5 shows both the short and long lines and identifies along which lines profile data were collected by the City of Lake Forest duplicated by the data collection of the ISGS.

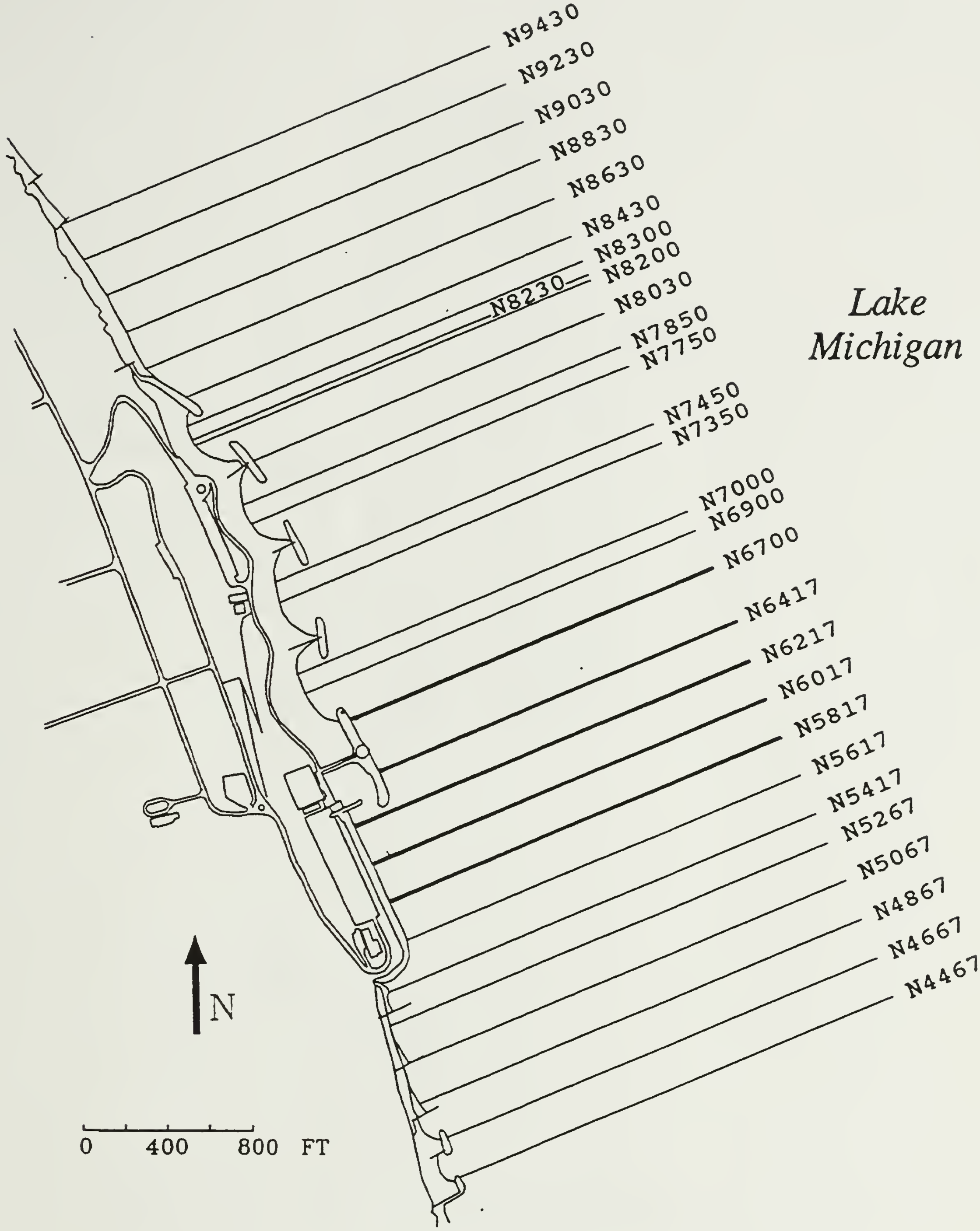


Figure 3 Location and designation of fathometer profile lines (long lines) surveyed by the ISGS during June 1995. Heavier lines indicate profiles not in the original (1991) profile scheme but added by the ISGS. Profiles N5817 through N6417 were added in 1992. Profile N6700 is part of the original scheme of short lines, but it was added as a long line in 1994 by ISGS in order to improve regular spacing of the long-line data set.

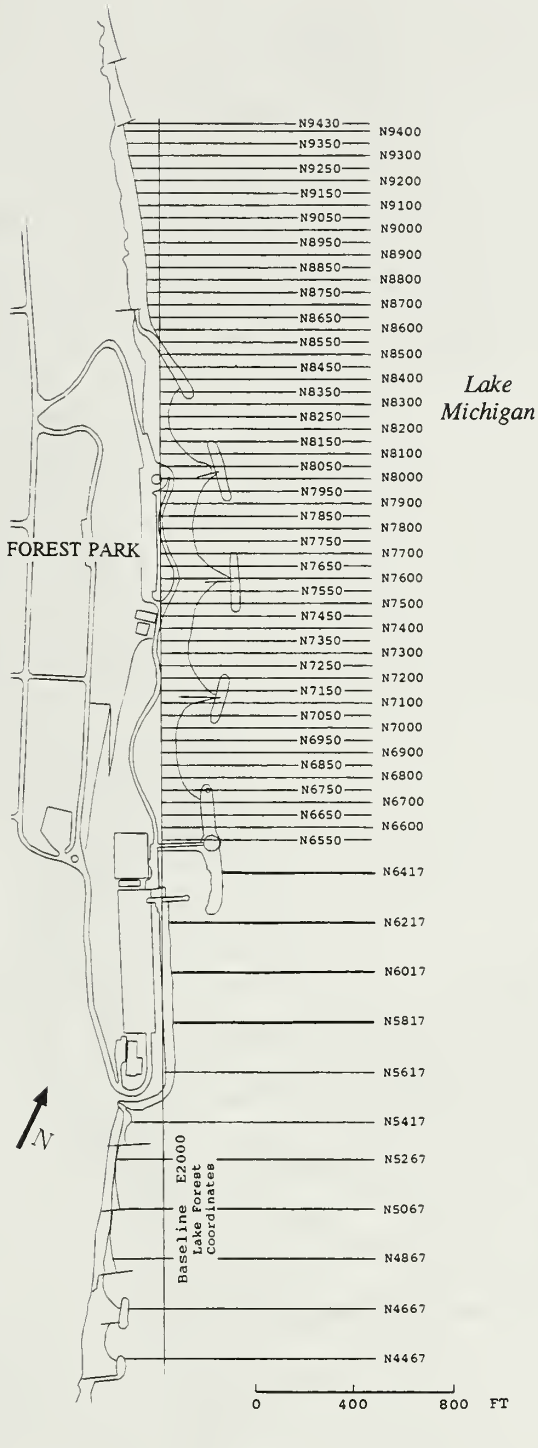


Figure 4 Location and designation of profiles (short lines) surveyed by the City of Lake Forest in 1995. Profiles are numbered from south to north using northings based on the local Forest Park Beach coordinate system. The baseline of E 2000 was used as the origin of all profiles within the limits of the Forest Park Beach facility. North and south of the facility, all profiles were extended west beyond the E 2000 baseline to origins established on the beach in 1991.

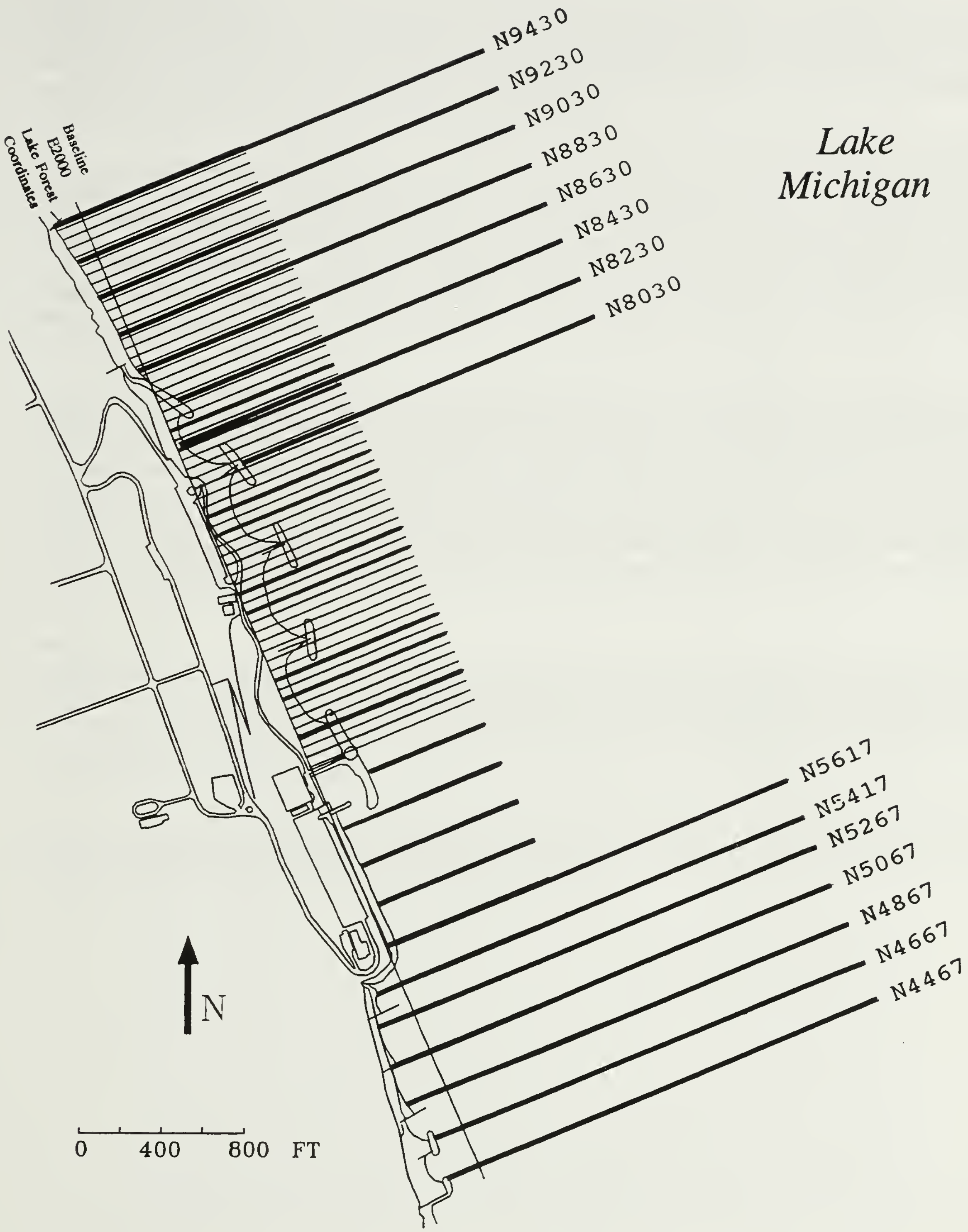


Figure 5 Location and designation of 1995 combined long and short profiles surveyed by the City of Lake Forest. Only numbering of long profiles (fathometer profiles) is shown. Bold designation is for City of Lake Forest long and short profiles that were duplicated by ISGS.

Prism-Pole Surveys
Prism-pole surveying refers to profiling across the beach and into the nearshore zone by two people—one holds a prism pole and advances in increments along the profile line, while the other shoots the position and elevation of the prism pole with a total station positioned at a bench mark in the project area to record position and elevation (figs. 6 and 7). Locations and elevations were referenced to a survey grid established by the City of Lake Forest during the 1991 monitoring (fig. 8).

The total station used by the ISGS was a Lietz/Sokkisha Set 4A with a Lietz SDR20 Electronic Field Book. All position and elevation data were recorded in the electronic field book attached to the total station. The person with the prism pole maintained position along the profile line by the alignment of onshore stakes, cones, or flags. Elevation measurements were normally made at horizontal intervals of approximately 5 to 10 ft (1.5 to 3 m). Smaller intervals were used to document notable changes in relief and bottom texture; longer intervals were used in areas with relatively constant slope. The profiling was extended offshore to about a 5-ft (1.5-m) depth to permit overlap with the fathometer data. Use of a wet suit allowed prolonged stay in the water.

A prism-pole survey was conducted on the landward part of every long line (fig. 3). Thus, 28 prism-pole survey lines were completed. The prism-pole surveys originated at some fixed upland feature such as a curb or crest of riprap, or where possible on the bluff slope along the west side of the project. Positions and elevations were taken across any upland features (e.g., riprap, beach, or breakwater stone) and were generally continued into the shallow nearshore to a maximum depth of about 5 ft (1.5 m). An exception was at the outside edges of breakwaters where, for safety reasons, prism-pole surveying ended at the farthest lakeward point (usually a face stone) that could be reached while standing on the subaerial breakwater stones. Profiles resulting from the ISGS surveys, combining both fathometer and prism-pole data, are shown in Appendix B.

Field Schedule
The ISGS collected 1995 beach and nearshore profile data at Forest Park Beach on June 22, 23, 24, 25, 26, 27, and 28 (table 2). Fathometer data were collected on June 22, 23, 24, and 28. The fathometer data were completed along the main scheme in three days (June 22, 23, and 24). On June 28 the fathometer data collection was solely related to a survey of the boat launch basin. Each of these days of fathometer data collection had calm water.

Prism-pole surveys were conducted on June 25, 26, and 27. Although wave height was as much as 1.5 ft (0.45 m) during some of these surveys (fig. 7), the prism pole provides a direct measurement of lake-bottom elevation independent of any water-level fluctuations.

Figure 6 ISGS total station set up at a reference mark on the north breakwater (Breakwater VI) being used to shoot location and elevation of the prism pole held by an assistant wading about neck-deep in the nearshore (photo date June 26, 1995).

Figure 7 ISGS field member using a prism pole for recording location and elevation along one of the prism-pole survey lines that enters a beach cell. Since the prism pole provides a direct measure of lake-bottom elevation, the waves in the nearshore do not affect the profile data (photo date June 26, 1995).

FOREST PART BEACH
LAKE FOREST, ILLINOIS
Survey Control Net

1. Brass cap in island.
   8,000 N
   2,000 E
   100 ft elev

2. Concrete nail in walk.
   7,532.79 N
   2,040.17 E
   98.39 ft elev

3. Brass cap on hill.
   7,124.16 N
   1,856.39 E
   108.15 ft elev

4. Concrete nail by dock.
   6,524.89 N
   1,980.31 E
   98.63 ft elev

5. Brass cap at sewer building.
   5,617.29 N
   2,000 E
   100.11 ft elev

6. Brass cap by flags.
   6,536.61 N
   2,216.15 E
   99.93 ft elev

7. 5,587.466 N
   1,998.631 E

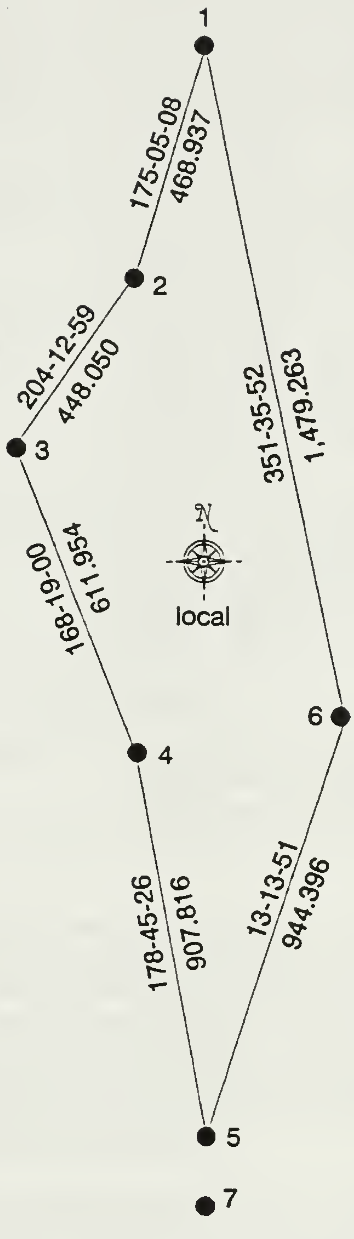


Figure 8 Survey control points used to establish profile locations and azimuths during the 1995 monitoring. This survey grid was first established for the 1991 monitoring and has been used in each successive year.

Table 2 1995 daily data collection by the Illinois State Geological Survey.		
June 22	Fathometer survey of long lines at north end.	N8030, N8200, N8230, N8300, N8430, N8630
June 23	Fathometer survey of long lines at north end, in Beach Cells 2, 3, and 4, and at small-boat basin.	N6417, N6700, N6900, N7000, N7450, N7750, N7850, N8830, N9030, N9230, N9430
June 24	Fathometer survey of long lines in Beach Cell 3 and at south end.	N4467, N4667, N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217, N7350
June 25	Prism-pole survey of lines at south end and in Beach Cells 3 and 4.	N4467, N4667, N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217, N6700, N6900, N7000, N7350
June 26	Prism-pole survey of lines in Beach Cells 1, 2, and 3, and at north end.	N7350, N7450, N7750, N7850, N8030, N8200, N8230, N8300, N8430, N8630, N8830, N9030, N9230, N9430
June 27	Prism-pole survey of small-boat basin.	N6368
June 28	Fathometer and prism-pole survey of small-boat basin.	E2055, E2100, E2135, N6272, N6316, N6368, N6368, N6417, N6476

ISGS DATA PROCESSING

Depths on the fathometer traces were tabulated at 5-m (16-ft) horizontal increments (thus at each sequential 10-m vertical mark and midway between these marks). Additional depth/distance points were interpolated for prominent features occurring between these 5-m (16-ft) increments. Because of the swell and wave conditions during the survey operation, it was necessary to draw a smooth line through some of the fathometer traces from which to measure the depths. Photo-reduced reproductions of these fathometer traces are included in Appendix A. For plotting the fathometer data on maps, the distances were referenced to the coordinates of the profile control point (the Mini-Ranger station) and converted to both Illinois state plane coordinates and the local coordinates of the City of Lake Forest survey grid.

All depths from the fathometer traces were first corrected to Lakes Michigan-Huron Low Water Datum (LWD). This correction involved a depth adjustment based on the average of hourly lake levels recorded by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), at Calumet Harbor, Illinois (Gauge No. 7044) and at Milwaukee, Wisconsin (Gauge No. 7057). The data were subsequently adjusted to Lake Forest Datum (LFD) by subtracting 2.06 ft (0.63 m) from the LWD depths. The profile data collected with a prism pole were measurements of lake-bottom elevations relative to the elevation of the brass cap, chisel mark, or concrete nail to which the total station was referenced. These data were adjusted to LFD by subtracting the LFD elevation of the appropriate brass cap, chisel mark, or concrete nail from the elevation of the surveyed points.

Table 3 shows hourly Calumet Harbor and Milwaukee lake-level elevations for the fathometer survey dates in June 1995. The mean correction to LFD (determined by averaging the water levels of the two gauges)

is the correction factor that was subtracted from the raw fathometer depth data to reduce depths to LFD. For all four dates during the hours of fathometer operations, there was excellent agreement in lake level at the Calumet and Milwaukee gauges. The greatest difference was 0.23 ft (0.07 m) at 1500 hours (CST) on June 24. The overall agreement between the two lake-level gauges attests to a lack of any lake level

Table 3 Lake levels in feet above given datum at Calumet Harbor, Illinois, and Milwaukee, Wisconsin (lake-level data from NOAA-NOS).

Hours CST	Calumet Harbor, Illinois		Milwaukee, Wisconsin		Calumet/ Milwaukee Lake Level Difference	Mean Correction to LWD	Mean Correction to LFD
	LWD	LFD	LWD	LFD			
June 22, 1995							
1600	2.12	0.06	2.25	0.19	0.13	2.18	0.12
1700	2.38	0.32	2.38	0.32	0.00	2.38	0.32
1800	2.31	0.25	2.28	0.22	0.03	2.30	0.24
1900	2.25	0.19	2.31	0.25	0.06	2.28	0.22
June 23, 1995							
0900	2.31	0.25	2.25	0.19	0.06	2.28	0.22
1000	2.25	0.19	2.38	0.32	0.13	2.32	0.26
1100	2.31	0.25	2.35	0.29	0.04	2.33	0.27
1200	2.45	0.39	2.38	0.32	0.07	2.42	0.36
1300	2.25	0.19	2.31	0.25	0.06	2.28	0.22
1400	2.35	0.29	2.25	0.19	0.10	2.30	0.24
1500	2.25	0.19	2.22	0.16	0.03	2.24	0.18
1600	2.18	0.12	2.22	0.16	0.04	2.20	0.14
1700	2.22	0.16	2.25	0.19	0.03	2.24	0.18
June 24, 1995							
0700	2.18	0.12	2.22	0.16	0.04	2.20	0.14
0800	2.35	0.29	2.31	0.25	0.04	2.33	0.27
0900	2.28	0.22	2.25	0.19	0.03	2.26	0.20
1000	2.45	0.39	2.31	0.25	0.14	2.38	0.32
1100	2.28	0.22	2.31	0.25	0.03	2.30	0.24
1200	2.41	0.35	2.25	0.19	0.16	2.33	0.27
1300	2.41	0.35	2.28	0.22	0.13	2.34	0.28
1400	2.38	0.32	2.28	0.22	0.10	2.33	0.27

Hours CST	Calumet Harbor, Illinois		Milwaukee, Wisconsin		Calumet/ Milwaukee Lake Level Difference	Mean Correction to LWD	Mean Correction to LFD
	LWD	LFD	LWD	LFD			
1500	2.48	0.42	2.25	0.19	0.23	2.36	0.30
1600	2.45	0.39	2.31	0.25	0.14	2.38	0.32
1700	2.28	0.22	2.25	0.19	0.03	2.26	0.20
1800	2.22	0.16	2.35	0.29	0.13	2.28	0.22
June 28, 1995							
0800	2.45	0.39	2.45	0.39	0.00	2.45	0.39
0900	2.45	0.39	2.48	0.42	0.03	2.46	0.40
1000	2.51	0.45	2.51	0.45	0.00	2.51	0.45

set-up, seiches, or regional fluctuations along this segment of the western lakeshore at the time of the surveys. However, the differences that do exist indicate how lake-level oscillations can cause dissimilarities in lake levels, as measured at these two separate sites. This can account for differences that may exist between profiles measured by the City with a total station and prism pole which are measurements not affected by changes in lake level, and profiles measured by the ISGS with a fathometer which are dependent on lake level at the time of surveying.

The X-Y-Z data of position and LFD-corrected depth were plotted as profiles using the ARC/INFO Geographic Information System (GIS). The profiles were drawn to the same scale, format, and vertical exaggeration (10x) as the City of Lake Forest report to facilitate comparisons. The fathometer (long) profiles with their beach/nearshore prism-pole components are given in Appendix B.

REVIEW OF THE CITY OF LAKE FOREST PROFILING PROCEDURES AND SURVEY GRID

During June 1995, the ISGS monitored the City of Lake Forest field procedures and operations. All City of Lake Forest profile data were collected between June 26 and July 23. Operations monitored by ISGS included the surveying to establish horizontal control points onshore along the profile lines and the profiling across the beach and nearshore. Profile locations were established using the control points shown in figure 8. The City followed all standard field procedures for such a survey. The City contracted with Manhard Consulting to perform the survey necessary to set up the profile lines and to operate the total station during profiling operations. All procedures followed accepted surveying practices.

Locations of profiles surveyed by the ISGS were independently verified using a prism pole and total station. The X-Y-Z coordinates determined by Manhard Consulting for the City of Lake Forest were replicated by the ISGS.

Beach Profiling

The 1995 profiling conducted by the City of Lake Forest was done entirely with a total station and prism pole in the same way that the City collected data in 1992, 1993, and 1994. The total station was set up at one of the established brass caps or chisel marks along the park property. The prism pole was moved along each of the profile lines. Data for X and Y (location) and Z (elevation) were recorded at each shot point in an electronic notebook attached to the total station. For profiling across the beach, over breakwaters, and into the water within several feet of the shoreline, a member of the survey team carried the prism pole.

Nearshore Profiling
The 1995 nearshore profiling conducted by the City of Lake Forest involved two boats and a tether line that extended from the shore to the lakeward limit of surveying. This line was held by an anchor or a spike at its shore end and by a boat at the lakeward end. The boat was kept at idle speed in reverse gear to hold the line taut. Onshore range markers allowed the boat operator to keep the tether line positioned along the desired profile. A second boat was yoked to the tether line and a crew member pulled this boat along the tether, stopping at premarked 20-ft (6-m) intervals. At each stop a crew member of this second boat placed the foot of the prism pole on the lake bottom and signaled the total-station operator to make a shot. After recording the location and elevation, the total-station operator signaled the boat to move to the next shot point. Data collection could proceed with successive points being shot in either landward or lakeward direction. In order to work in water deeper than the maximum extension of a standard prism pole, the prism was mounted atop a 20-ft (6-m) telescoping surveyor's rod.

Fathometer Profiling
The original requirements of the five-year monitoring program had the City of Lake Forest collecting fathometer data along the 15 so-called "long lines" in the first year of the program and again in the final year (see Chrzastowski and Trask 1992, fig. 3). During the fifth year (1995), these fathometer data were collected for the City of Lake Forest by Hydrographic Survey Co. of Chicago. A total of 15 long profiles were run. A fathometer was used for all depth recording; a digital tracking theodolite was used for all offshore position control.

General Statement on City of Lake Forest Profiling Procedures
The prism-pole method of profiling used by the City of Lake Forest is one of the most accurate ways of collecting profile data. This provides a direct measurement of lake-bottom elevation that is not influenced by fluctuations in lake level, surface oscillations caused by waves, or any uncertainty of variations in the travel time of a sonar signal through the water column. The fathometer data collected in 1995 by Hydrographic Survey Co. for the City of Lake Forest should be considered secondary in quality compared to the prism-pole data.

COMPARISON OF ISGS AND CITY OF LAKE FOREST PROFILES

Twenty-eight of the profiles surveyed by the City of Lake Forest were also surveyed by the ISGS. Eight of these profiles are short-lines centered in the beach cells; 15 are the long profiles from north and south of the Forest Park Beach project, and the remaining five are supplemental short profiles added at the southern half of the Forest Park Beach facility.

Comparison Summary
Profiles surveyed by the ISGS using a combination of prism pole and fathometer and those surveyed by the City of Lake Forest using a prism pole generally exhibit excellent agreement (Appendix C) in spite of the differences in the methods of data collection. As in previous years' comparisons, some localized discrepancies occur, but these can all be explained by such factors as the difficulties of obtaining reproducible data points across the irregular clay lake bottom that exists lakeward of the sand/clay interface, or obtaining reproducible points across the stone of breakwaters and revetments. A thorough discussion of the types of explained discrepancies is included in the reports for the Year-3 monitoring (Chrzastowski and Trask 1994) and the Year-4 monitoring (Trask and Chrzastowski 1995).

A discrepancy in the 1995 data was identified when the City of Lake Forest long profile fathometer data were compared with the ISGS fathometer data. The City of Lake Forest data consistently record shallower depths, generally in the range of 0.5 to 1.1 ft (0.15-0.34 m). If the City of Lake Forest prism-pole data are compared with the City of Lake Forest fathometer data, this discrepancy is similarly observed. Thus the ISGS data verify the reproducibility of the City of Lake Forest's data along all short profiles, but the City's long-profile data has a persistent vertical error. Appendix H provides comparisons along the short profiles where there are three independent data sets, namely ISGS prism-pole/fathometer data, City of Lake Forest prism-pole data, and City of Lake Forest fathometer data. In this three-way comparison of data sets, the City of Lake Forest fathometer data is clearly suspect.

Conclusion
Along all of the short profiles, minor discrepancies occur in some common segments of the ISGS and City of Lake Forest data sets collected in 1995, but these can be explained by lake-level corrections, complications in mapping across irregular lake-bottom materials, or differences in the number and location of points across riprap or breakwater stones.

Sufficient comparison data are available for us to conclude that the prism-profile data collected in 1995 by the City of Lake Forest are reproducible. Thus, the profile data are verified. These data can be compared with data from 1994, 1993, 1992, and 1991.

The 1995 City of Lake Forest fathometer data for the long lines has a vertical error in the range +0.5 to +1.1 ft (+0.15 to +0.34 m). These data should not be used as reported in the 1995 City of Lake Forest report (Magnus et al. 1996) without a vertical correction applied. The cause of this error is not known, although this appears to be a problem related to the reference to a datum. If in the future there is a need to use 1995 long-profile fathometer data, the ISGS 1995 fathometer data should be the preferred data set. The vertical error in the City of Lake Forest fathometer data does not invalidate the 1995 monitoring by the City, but it limits application of these data.

AREAL AND VOLUMETRIC TRENDS IN ACCRETION AND EROSION

In this section, the bathymetric maps compiled from the 1994 and 1995 data are compared to determine accretion or erosion across the mapped area over the 1-year period since the 1994 monitoring was conducted. The ISGS used its GIS (ARC/INFO) to perform this comparison.

Bathymetric/Topographic Maps
Maps of bathymetry and beach topography were constructed from a combination of City of Lake Forest and ISGS data. Data collected by the City had precedence and were used for those areas where the City conducted prism-pole surveys. Only ISGS data were available for lakeward of these areas and for the boat basin. The bathymetric maps at a scale of 1:4,800 are shown in figures 9 (1994) and 10 (1995). Enlargements of the beach topography and nearshore bathymetry for the beach cells are shown at a scale of 1:2,400 in figures 11 (1994) and 12 (1995). These larger scale maps are presented, as in past years, to provide detail of beach topography not shown on the smaller scale maps.

Data collected by the City of Lake Forest were used to construct those parts of the maps from the concrete wall or other landward-most point at the head of the beach to a distance 800 ft (244 m) lakeward of the 2,000-ft baseline; this 800-ft distance is the lakeward limit of the City's prism-pole data. Outside this limit, ISGS long-profile data were used to construct the maps. Locally, ISGS wading profiles were used landward of the City's data to contour beach topography.

In a pocket at the back of this report is a 1995 bathymetric/beach-topography map (plate 1). It is at a scale of 1:1,200 and shows all data points from the 1995 surveys and the contours drawn at a 1-ft interval using these data points. Only City of Lake Forest data are shown along profile segments where both ISGS and City data were collected. City of Lake Forest fathometer data are excluded from this map. The 1-ft contours are the same as those presented in the page-size maps in figures 9 and 11. This 1:1,200-scale map is provided as a base map for future data comparisons. A similar map was prepared by the ISGS for the 1992 data (Trask and Chrzastowski 1993), 1993 data (Chrzastowski and Trask 1994), and 1994 data (Trask and Chrzastowski 1995).

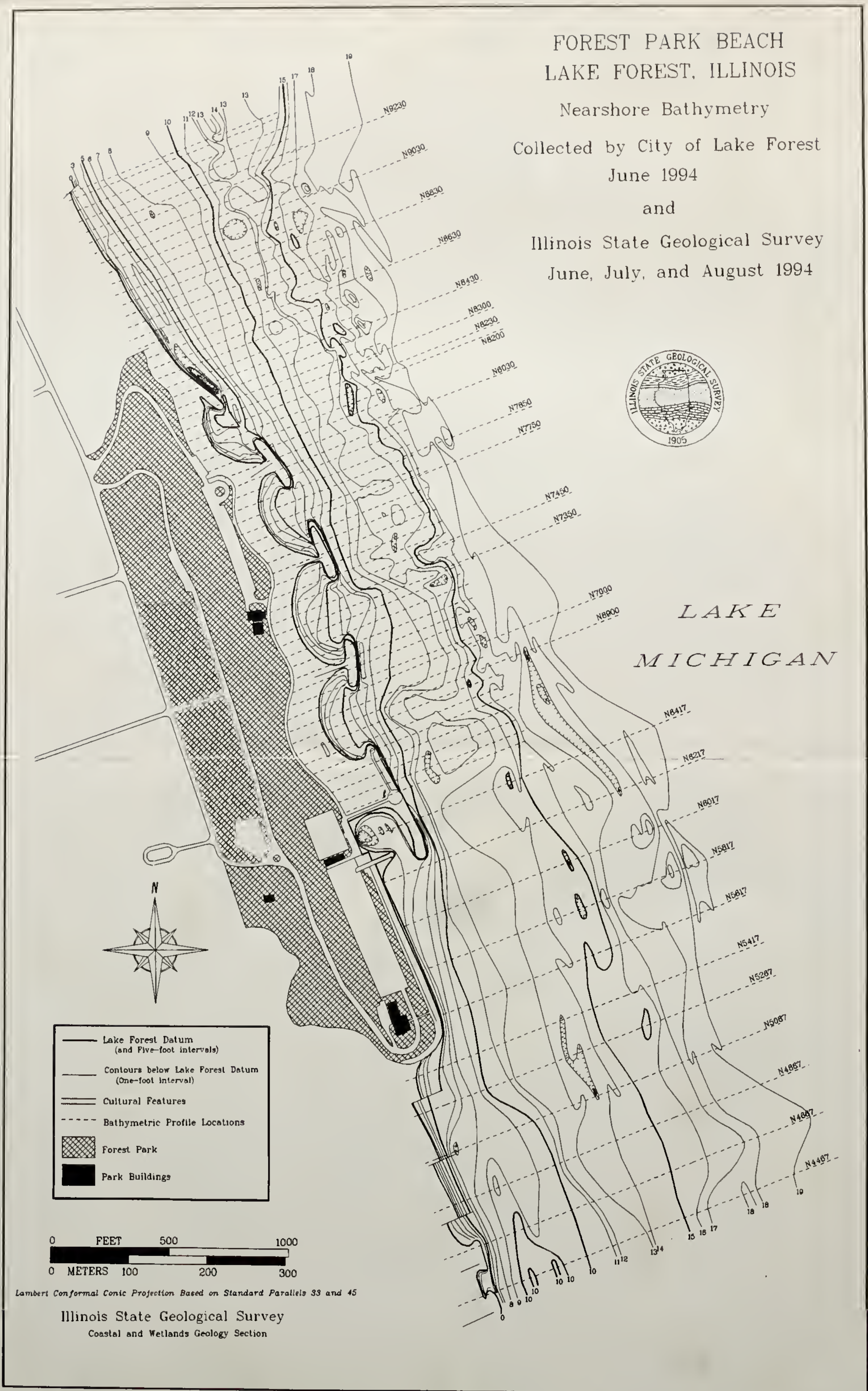


Figure 9 1994 nearshore bathymetry of the Forest Park Beach area contoured by the ISGS from profile data collected by the City of Lake Forest in June 1994 and the ISGS in June, July, and August 1994.

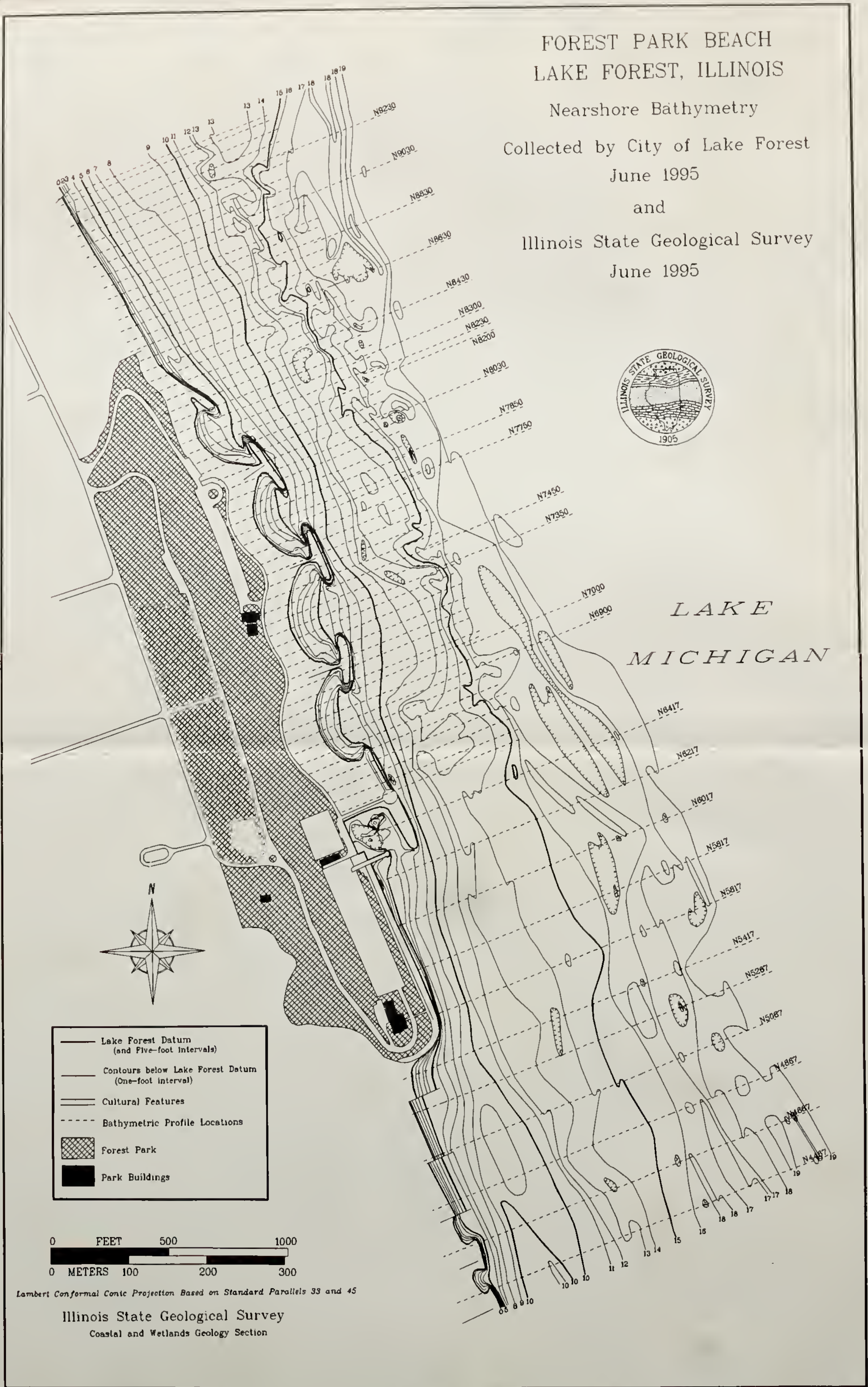


Figure 10 1995 nearshore bathymetry of the Forest Perk Beech area contoured by the ISGS from profile deta collected by the City of Lake.Forest in June end July 1995 end the ISGS in June 1995.

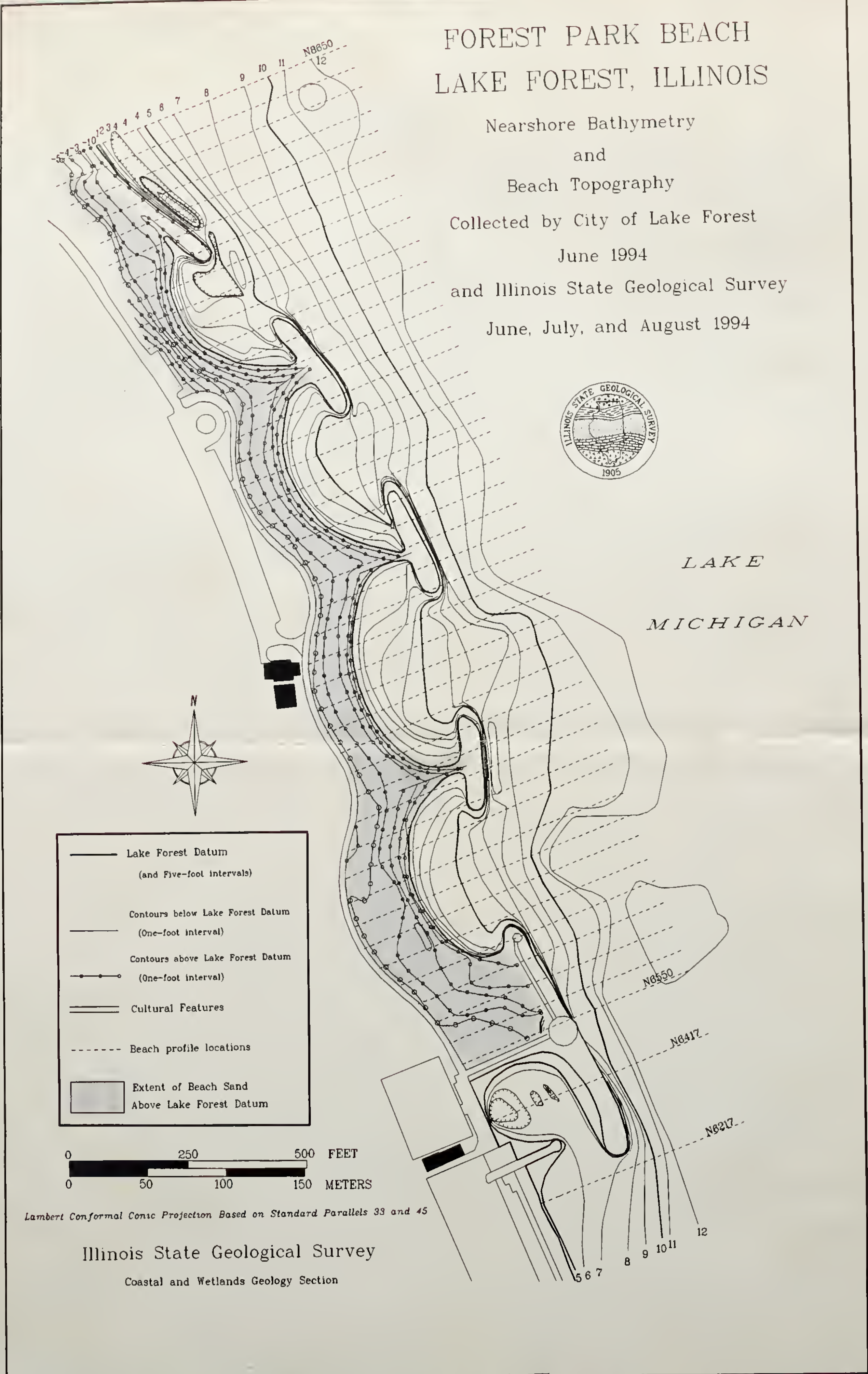


Figure 11 1994 nearshore bathymetry and beach topography of Forest Park Beach contoured by the ISGS from profile data collected by the City of Lake Forest in June 1994. This map differs from figure 9, in that it is a larger scale and contains beach topography.

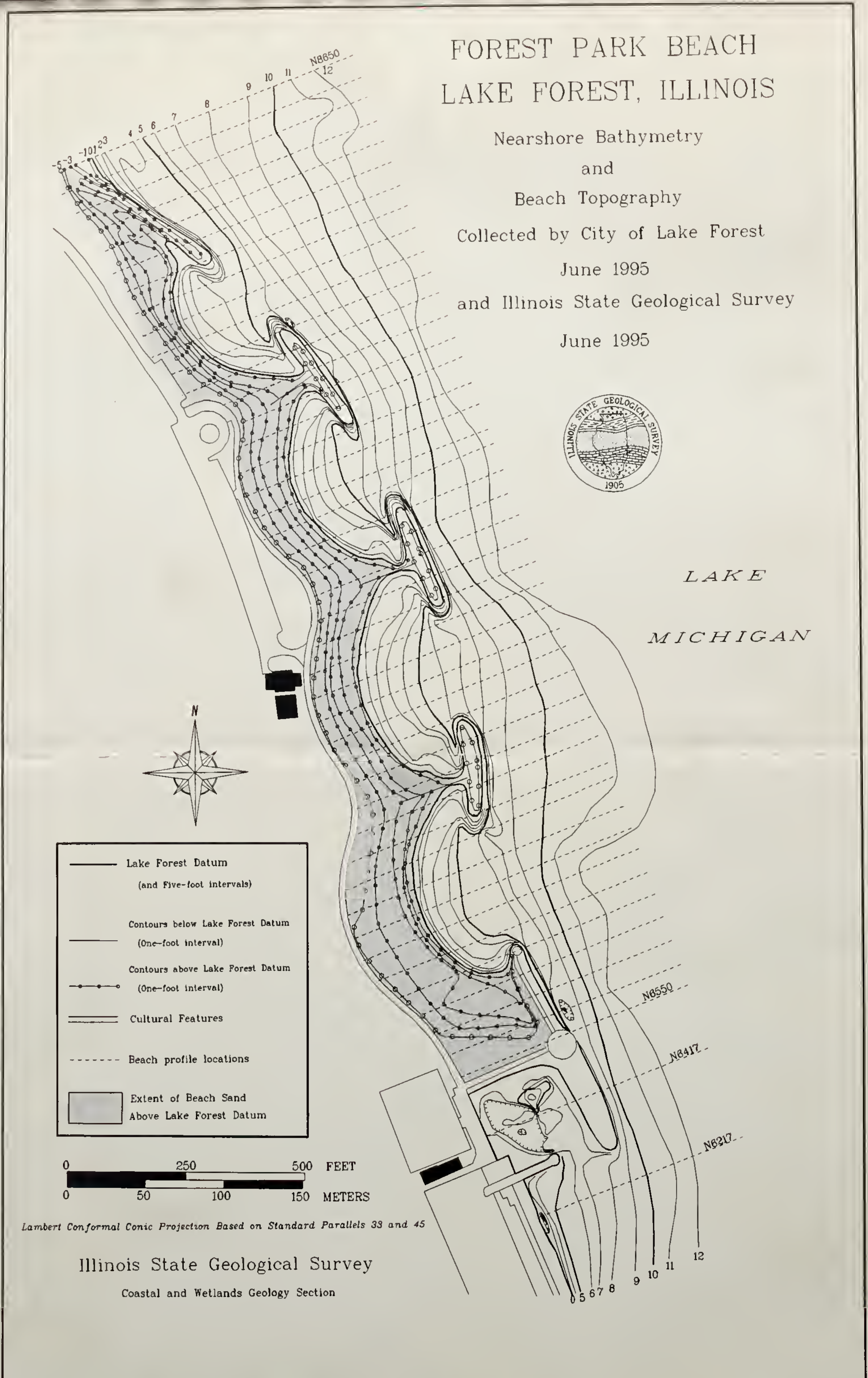


Figure 12 1995 nearshore bathymetry and beach topography of Forest Park Beach contoured by the ISGS from profile data collected by the City of Lake Forest in June and July 1995. This map differs from figure 10, in that it is a larger scale and contains beach topography.

Beach and Nearshore Change Map

The 1994 and 1995 maps of beach topography and nearshore bathymetry were compared, using the triangulated irregular network (TIN) procedure, and a map was generated showing changes in beach topography and nearshore lake-bottom bathymetry (fig. 13) that occurred during this 1-year interval. The procedure is discussed by Trask and Chrzastowski (1993). Detailed procedures for working with TIN are provided in the ARC/INFO User's Guide for Surface Modeling with TIN (Environmental Systems Research Institute, Inc. 1991). A modification to this procedure was made for the area of Breakwaters I, II, and III. As noted by Chrzastowski and Trask (1994), an area of deep bathymetry opposite Beach Cell 4 was preventing development of bypass in this area. During the 1994 monitoring in this area, the City of Lake Forest documented a lakeward excursion of the sand/clay interface to a depth of 15 ft (4.6 m); elsewhere, the 12-ft (3.7-m) contour approximated the sand/clay interface. Therefore, rather than delete 1 ft (0.3 m) or less accretion and erosion lakeward of the 12-ft (3.7-m) depth, all accretion and erosion was documented on the 1995 map (fig. 13) to a depth of 15 ft (4.6 m).

The 1994-1995 beach and nearshore change map is shown in figure 13 at a scale of 1:4,800. This map shows only those areas where accretion or erosion is greater than or equal to 1 ft (0.3 m). This 1-ft datum or threshold for depicting areas of gain or loss thus focuses on the areas of major change and ignores any change of less than 1 ft.

It is apparent from the map that no distinct pattern of erosion or accretion occurred between 1994 and 1995. The sum of all erosional volumes exceeds that of accretion. In this plan view, the aerial extent of erosion exceeds accretion. Erosion occurred in patchy areas scattered within the beach cells, lakeward of the breakwaters, and on the exposed beach.

The major accretional areas were in the shallow nearshore on the updrift (north) side of the northern breakwater (Breakwater VI), in the area south of the boat-launch basin, and in the shallow nearshore between the groins along the residential properties south of the Forest Park Beach facility.

Volumetric Changes, 1994-1995

Volumetric changes for the one-year interval from 1994 to 1995 were computed for the City of Lake Forest by the firm W. F. Baird & Associates (1996). The ISGS also performed a volumetric analysis for comparison. The procedures used by Baird & Associates and the ISGS were similar, both using a TIN procedure to compare surfaces defined by the two data sets. Several differences occur in the two analyses.

1. Baird & Associates used the 1994 or 1995 sand/clay interface as the lakeward boundary in defining areas for volume calculations; the one located the farthest east (lakeward) was selected. The ISGS used the 1995 15-ft (4.6-m) contour as the lakeward boundary. Within the monitoring area, this contour and the interface approximate each other. This was not, therefore, considered a significant difference in procedures.

2. Baird & Associates also computed change volumes lakeward of the sand/clay interface. The ISGS did not compute any changes lakeward of the 15-ft (4.6-m) contour in an attempt to confine all calculations to the area where the nearshore lake bottom is covered by sand. The potential problem with using data lakeward of the sand/clay interface (i.e., lakeward of the 15-ft (4.6-m) contour) is that placement of the prism pole on a boulder protruding as much as 1 ft (0.3 m) from the lake floor could imply significant accretion or erosion where none had actually occurred.

3. The ISGS used the City's 1994 and 1995 data to compute volume changes lakeward of the southern part of Forest Park Beach (between profiles N5617 and N6550; southern lakeward perimeter, fig.4). This area was not included in the analysis by Baird & Associates because the original plans for the monitoring program do not require the City to compute volume changes in this area.

Figure 13 Beach and nearshore changes, from 1994 to 1995. Only thosa changes greater than 1 ft ara shown.

4. The ISGS contoured the data by hand prior to the TIN analysis to provide a geologic interpretation of the data using known principles of longshore transport of sand. Baird & Associates performed the TIN on raw data. We do not know what surface-modeling principles and parameters were used by Baird & Associates to create the TIN. Therefore, it is not known if these two different techniques contribute significantly different results to the analysis.

The City of Lake Forest has divided Forest Park Beach into seven areas (fig. 14) for evaluating changes in accretion and erosion (Baird & Associates 1996). In this report, the same five areas (or "zones") of Trask and Chrzastowski (1993), Chrzastowski and Trask (1994), and Trask and Chrzastowski (1995) are used. The areas/zones are the Updrift Zone (Lake Forest areas 1 and 5), the Beach Cells (Lake Forest area 2), the Lakeward Perimeter (Lake Forest areas 3 and 6), the Southern Lakeward Perimeter (not mapped by the City of Lake Forest), and the Downdrift Zone (Lake Forest areas 4 and 7). Lake Forest areas 5, 6, and 7 had a landward limit corresponding to the sand/clay interface from either 1994 or 1995, whichever was farther east (Baird & Associates 1996).

Table 4 shows the volumes of material accreted to or eroded from each of these five areas from 1994 to 1995. In reports of the 1991 and 1992 monitoring, the ISGS used a 1-ft (0.3-m) threshold; all erosion or accretion less than 1 ft (0.3 m) was considered to be within the range of potential procedural error because the data were primarily from fathometer records, which are less accurate than prism-pole readings. The 1992-1993 comparison was of equivalent prism-pole data sets, and thus a zero threshold was considered appropriate (Chrzastowski and Trask 1994). The same was true for the 1993-1994 comparison (Trask and Chrzastowski 1995). Likewise, comparison of volume and erosion for the 1994-1995 data set uses the 0-ft cutoff as does the City of Lake Forest (Magnus et al. 1996; Baird & Associates 1996).

ISGS volume calculations for several different thresholds (0, 0.5, 1.0 ft, etc.) are included in Appendix D. Table 4 compares the ISGS calculations with the total volume calculations of the City of Lake Forest (prepared by W. F. Baird & Associates 1996). Comparison of the two sets of data varies. For example, Table 4 shows that the values for accretion in the Updrift and Downdrift Zones are essentially the same, while the values for erosion and net change in the Lakeward Perimeter Zone are substantially different. However, areas 5, 6, and 7, for which the city computed accretion and erosion and which are included in table 4, are located lakeward of the sand/clay interface and lakeward of the ISGS zones. Calculations of accretion and erosion in this area consider changes in the clay-bottomed lake floor lakeward of the sand prism; such calculations may reflect differences in placement of the prism pole in this part of the monitoring area and not actual accretion or erosion. As is also the case with placement of the survey point, placement of the prism pole on a boulder or series of boulders rather than the clay lake floor can cause measurement of apparent accretion lakeward of the sand/clay interface.

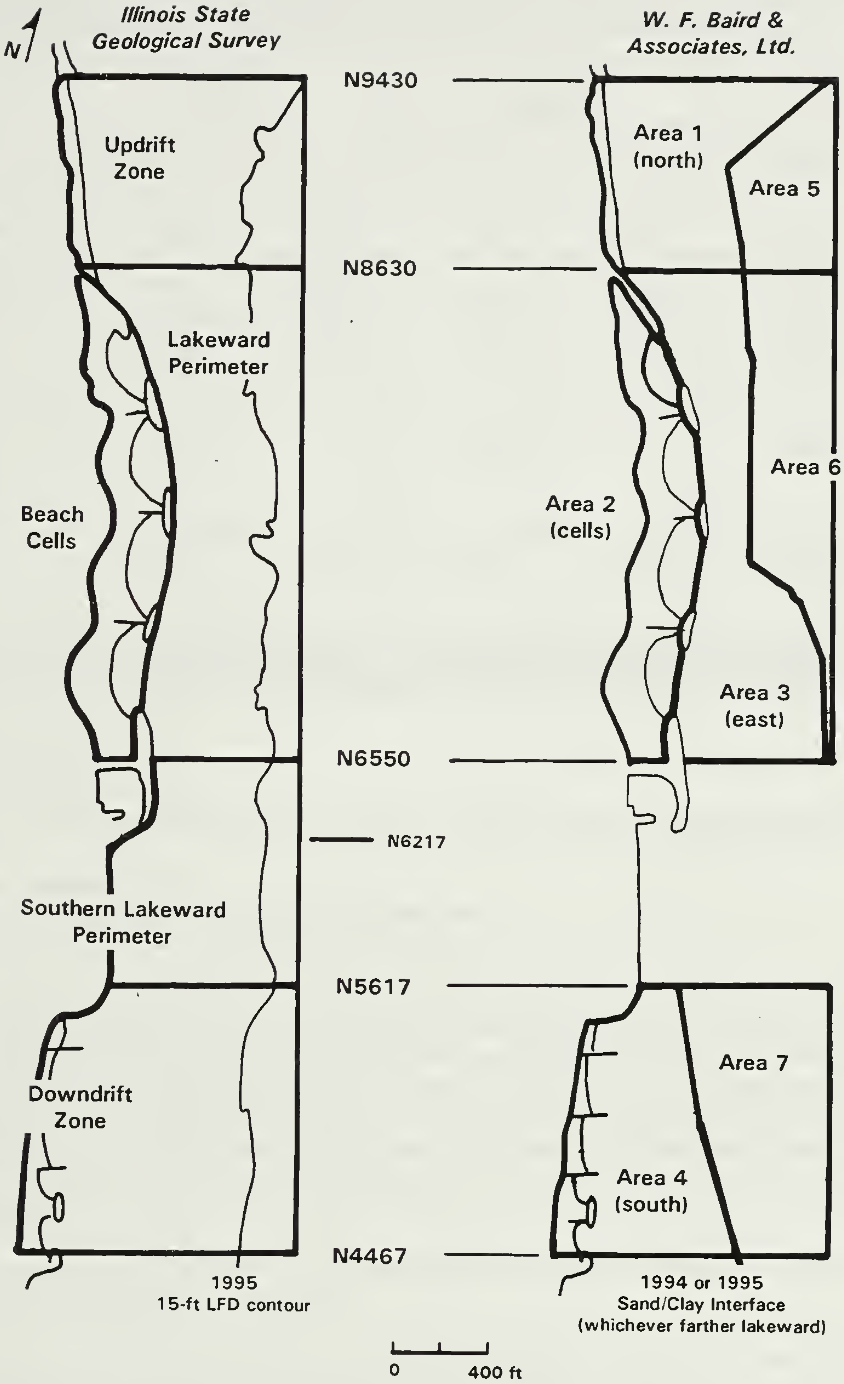


Figure 14 Zones of the monitoring area, as defined by the ISGS and by W.F. Baird & Associates, for calculation of 1994-1995 volumetric changes.

Table 4 Comparison of the ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1995 monitoring season. All monitoring areas of the City are included. The threshold is 0 ft; units are cu yd. Calculations are rounded to the nearest 100 cu yd.

Zone	Accretion		Erosion		Net change	
	ISGS	City	ISGS	City	ISGS	City
Updrift Zone[1]	1,600	1,400	3,600	5,100	-2,000	-3,700
Beach Cells[2]	4,200	2,200	5,400	4,100	-1,200	-1,900
Lakeward Perimeter[3]	4,400	3,400	7,100	11,700	-2,700	-8,300
Southern Lakeward Perimeter[4]	1,400	--	9,000	--	-7,600	--
Downdrift Zone[5]	900	700	10,600	16,300	-9,700	-15,600
Total[6]	11,100	7,700	26,700	37,200	-15,600	-29,500

[1]Lake Forest areas 1 and 5.
[2]Lake Forest area 2.
[3]Lake Forest areas 3 and 6.
[4]The monitoring program does not require Lake Forest to perform volume calculations across this area.
[5]Lake Forest areas 4 and 7.
[6]Total does not include Southern Lakeward Perimeter.

Table 5 is an alternative comparison of ISGS calculations with those of the City of Lake Forest without inclusion of City areas 5, 6, and 7. These areas fall outside (lakeward) of the sand/clay interface and commonly represent areas underlain only by till. The two calculations are more nearly the same in this comparison (table 5) than in the previous one (table 4). Net change in the Lakeward Perimeter is still substantially different between the two surveys. The report for the Year-4 (1994) monitoring (Trask and Chrzastowski 1995, pp. 31-32) includes a discussion of the mapping differences between ISGS and Baird & Associates that may account for such discrepancy. The discrepancy does not invalidate any of the volume calculations.

Summarizing the comparison of equal areas in table 5, the 1994-1995 accretion and erosion in the Forest Park Beach monitoring area are as follows:

> Accretion: 11,100 cu yd (8,500 cu m) calculated by the ISGS and 6,900 cu yd (5,300 cu m) calculated by the City. The ISGS calculated an additional 1,400 cu yd (1,100 cu m) of accretion in the Southern Lakeward Perimeter.
>
> Erosion: 26,700 cu yd (20,400 cu m) calculated by the ISGS and 25,700 cu yd (19,600 cu m) calculated by the City. The ISGS calculated an additional 9,000 cu yd (6,900 cu m) of erosion in the Southern Lakeward Perimeter.

Table 5 Comparison of the ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1995 monitoring season. Data from Lake Forest areas 5, 6, and 7 are not included. The threshold is 0 ft; units are cu yd. Calculations are rounded to the nearest 100 cu yd.

Zone	Accretion		Erosion		Net change	
	ISGS	City	ISGS	City	ISGS	City
Updrift Zone[1]	1,600	1,100	3,600	4,000	-2,000	-2,900
Beach Cells[2]	4,200	2,200	5,400	4,100	-1,200	-1,900
Lakeward Perimeter[3]	4,400	3,100	7,100	8,100	-2,700	-5,000
Southern Lakeward Perimeter[4]	1,400	–	9,000	–	-7,600	–
Downdrift Zone[5]	900	500	10,600	9,500	-9,700	-9,000
Total[6]	11,100	6,900	26,700	25,700	-15,600	-18,800

[1] Lake Forest area 1.
[2] Lake Forest area 2.
[3] Lake Forest area 3.
[4] The monitoring program does not require Lake Forest to perform volume calculations across this area.
[5] Lake Forest areas 4.
[6] Total does not include Southern Lakeward Perimeter.

Summation of the 1994-1995 total accretion and erosion for the City of Lake Forest areas 1 through 4 and comparable areas measured by the ISGS results in net erosion of 18,800 cu yd (14,400 cu m) as measured by the City and net erosion of 15,600 cu yd (11,900 cu m) as determined by the ISGS. This is a difference of 17%. In addition, the ISGS calculated net erosion of 7,600 cu yd (5,800 cu m) in the Southern Lakeward Perimeter.

The purpose of the ISGS volume calculations is to provide an independent check on the calculations reported by the City of Lake Forest. Differences occur for individual areas of evaluation, but there is overall agreement.

The 1994-1995 net change across the beach and nearshore sand of the monitoring area can be summarized as follows:

1. Excluding the Southern Lakeward Perimeter Zone and excluding changes lakeward of the sand/clay interface, the ISGS and the City are in agreement within 3,200 cu yd (2,400 cu m). Net erosion, if the two values are averaged, was approximately 17,200 cu yd (13,200 cu m).

2. If the Southern Lakeward Perimeter Zone is included and all lake-bottom landward of the 1995 sand/clay interface is considered, ISGS calculations indicate the 1994-1995 net change is erosion totaling 23,200 cu yd (17,700 cu m).

Volumetric Changes 1987-1995

Data gathered over the past five years can be combined with data gathered during the initial three years of monitoring to estimate the total accretion and erosion in the Forest Park Beach area since its construction (table 6). Using a 0-ft threshold (all accretion and erosion considered) for 1992-1995, a 1-ft (0.3 m) threshold for 1987-1992, and using ISGS calculations, the net change in the project area has been accretion of 45,800 cu yd (35,000 cu m). This is an average accretion of 5,700 cu yd (4,400 cu m) per year over the 8-year period from 1987 to 1995.

The net changes tabulated in table 6 indicate that accretion dominated in the first five years following construction (1987-1992). Since 1992, however, the annual net changes have varied between accretion and erosion. This means that the lake-bottom in the vicinity of Forest Park Beach remains a dynamic system, and not all accretion that occurs during any given year should be considered permanent.

Prior to the 1995 monitoring year, net annual change ranged from accretion of 7,500 cu yd (5,700 cu m) during the first year following construction to erosion of 1,100 cu yd (800 cu m) during the 1992-1993 monitoring interval. The change in 1993-1994 was the greatest amount of net accretion to be documented in the project area during either of the monitoring programs and exceeded the net accretion over the four-year period from 1988 to 1992. Broken into the five ISGS monitoring zones (fig. 14), accretion and erosion for this 8-year period are as follows:

Accretion (1987-1995):		
Updrift Zone	(+19,200 cu yd;	+14,700 cu m)
Beach Cells	(+28,600 cu yd;	+21,900 cu m)
Lakeward Perimeter	(+53,400 cu yd;	+40,800 cu m)
Southern Lakeward Perimeter	(+12,100 cu yd;	+ 9,300 cu m)
Downdrift Zone	(+16,900 cu yd;	+12,900 cu m)
Erosion (1987-1995):		
Updrift Zone	(–10,000 cu yd;	– 7,600 cu m)
Beach Cells	(–17,500 cu yd;	–13,400 cu m)
Lakeward Perimeter	(–13,600 cu yd;	–10,400 cu m)
Southern Lakeward Perimeter	(–20,100 cu yd;	–15,400 cu m)
Downdrift Zone	(–23,200 cu yd;	–17,700 cu m)

Table 6 Volumes of material accreted to or eroded from Forest Park Beach monitoring area between 1987 and 1995.			
Period	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987-1988[1]	19,300	11,800	+7,500
1988-1992[1]	33,700	10,300	+23,400
1992-1993[2]	20,400	21,500	–1,100
1993-1994[2]	44,300	5,100	+39,200
1994-1995[2]	12,500	35,700	–23,200
summation 1987-1995	130,200[3]	84,400	+45,800

[1]One-foot threshold is used due to inaccuracies in data and less precise survey techniques prior to 1992.
[2]Zero-foot threshold is used.
[3]Accretion may include a component of the beach nourishment supplied to the Downdrift Zone by the City of Lake Forest between 1991 and 1993.

COASTAL SEDIMENT DYNAMICS

Sand/Clay Interface

Figure 15 shows the location of the interface between lake-bottom sand and glacial till (also called the sand/clay interface) as it was mapped in 1995. For reference, the location of the interface is also shown for 1986 and each year from 1988 to 1994. Prior to 1991, the interface was mapped on the basis of an examination of fathometer traces. Since 1991, the interface has been mapped by diver survey.

Previous ISGS reports for this monitoring program have discussed in detail the annual changes in location of the sand/clay interface (Chrzastowski and Trask, 1992, 1994; Trask and Chrzastowski, 1993, 1995). No major difference in location occurs in the comparison for 1994 and 1995. During this one-year interval, the interface appears to have been stationary. This fifth and final year of the five-year monitoring program is the only year that such stability of the interface has been recorded. Although net erosion occurred in the monitoring area between 1994 and 1995, this net erosion did not diminish the total area of nearshore sand cover.

Changes in Lake-Bottom Morphology

The configuration of bathymetric contours around the perimeter of the Forest Park Beach facility has been discussed in previous ISGS reports as evidence for building a "sand bridge" for natural sand bypass. As noted in the ISGS reports for the 1992, 1993, and 1994 monitoring, annual comparisons of the position of the 10-ft (3-m) and 12-ft (3.7-m) depth contour provide good references for observing the southward advance of this accretion lobe. The pattern observed in the past is that a wide accretion band extended southward to near Breakwater II. From here southward, the accretion band was narrower. Previous reports have discussed a bathymetric depression located lakeward of Beach Cell 4, which was interpreted as slowing the southward advance of this wide accretion band until the depression could be gradually infilled.

The 12-ft (3.7-m) contour best illustrates this lake-bottom depression. Figure 16 shows the 12-ft (3.7-m) contour for three annual comparisons of 1992-1993, 1993-1994, and 1994-1995. In the 1992-1993 comparison, and in the 1993-1994 comparison, accretion on the northern side of this depression was a prime factor in past interpretations that accretion processes were acting to infill the depression. The 1994-1995 comparison shows that the ongoing processes are a bit more complex in that both erosion and accretion are acting to eliminate the depression as a distinct lake-bottom feature, resulting in a more linear

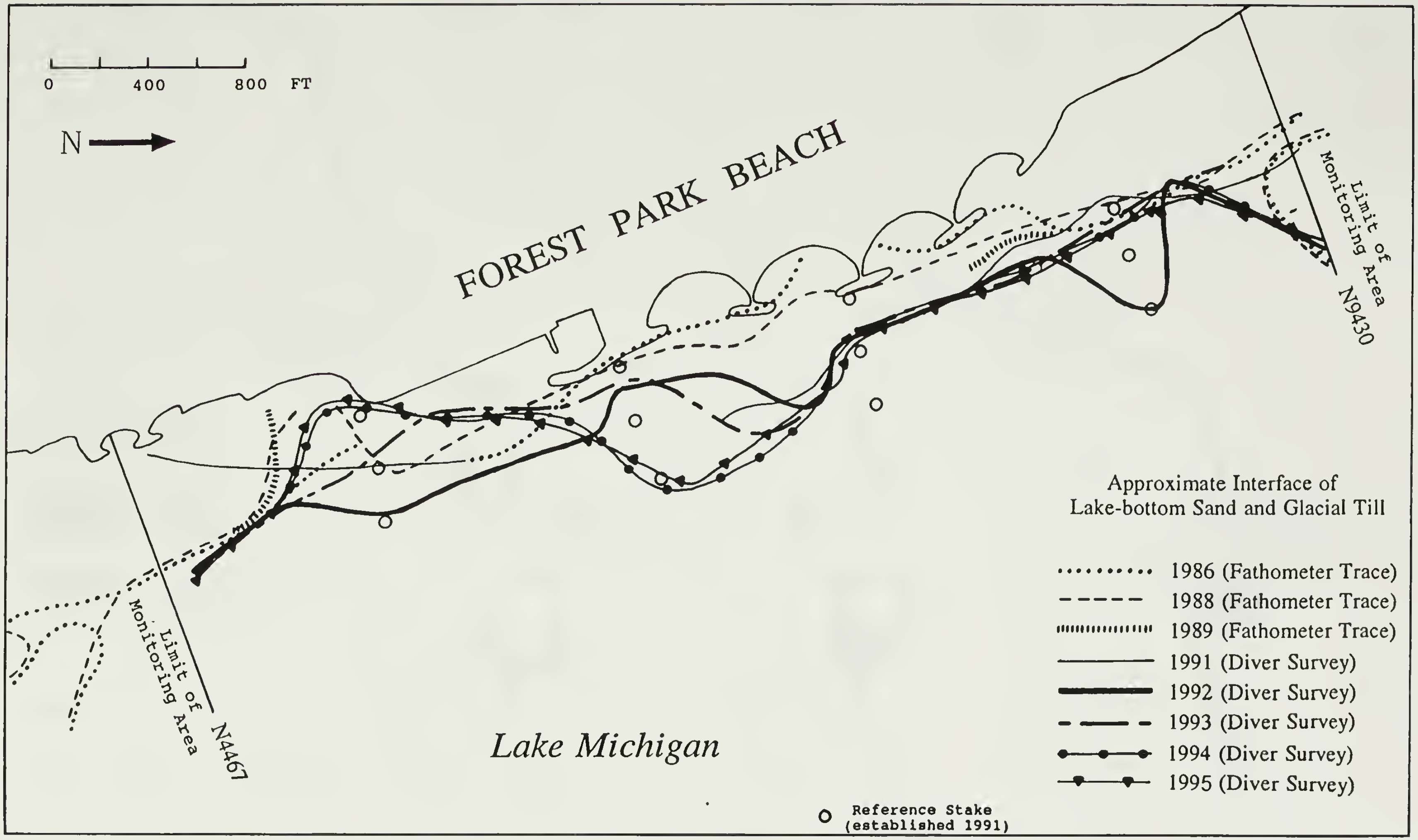


Figure 15 Location of the interface between lake-bottom sand and glacial till. 1986,1988, and 1989 mapping from Lake Forest Shoreline Monitoring Committee (1990b); 1991 mapping from CH2M HILL (1992); 1992 mapping from Magnus (1993a); 1993 mapping from Magnus (1993b); 1994 mapping from Magnus et al. (1994); 1995 mapping from Magnus, Hammer, and Miller (1996).

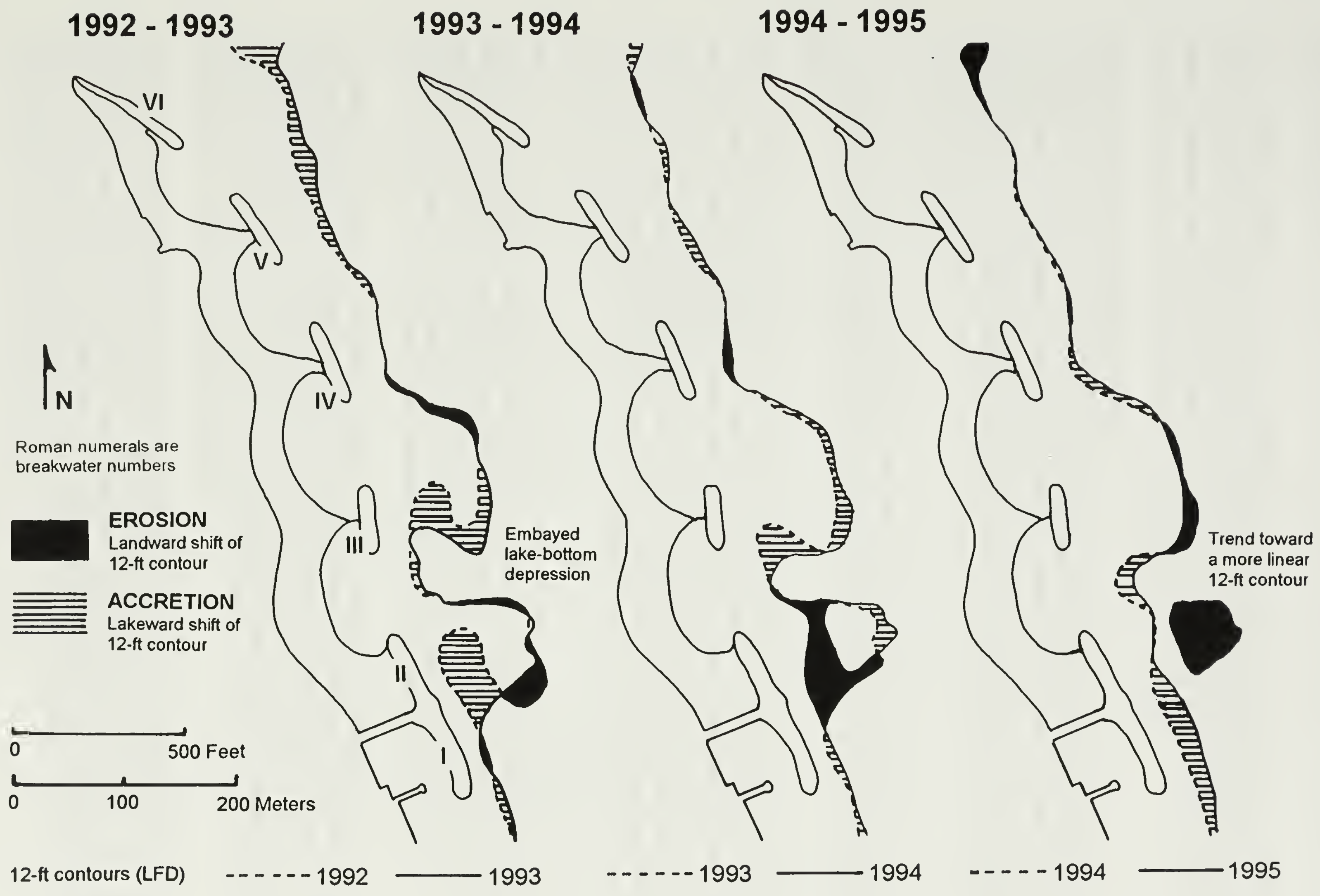


Figure 16 Annual comparison of the location of the 12-ft (3.7-m) bathymetric contours between 1992 and 1995.

overall trend for the 12-ft (3.7-m) contour. Between 1994 and 1995, erosion reduced the width of the lobate section opposite Breakwater III; accretion increased the width between Breakwaters I and II and the 12-ft (3.7-m) contour.

The conclusion based on these comparisons of the 12-ft (3.7-m) contour is that, as of 1995, changes in lake-bottom morphology were continuing to improve the efficiency of the sand bridge for natural bypass of the facility. If the process continues, the 12-ft (3.7-m) contour can be expected to achieve a rather uniform distance lakeward of the breakwaters. Any future changes in position of the 12-ft (3.7-m) contour should primarily occur in the area lakeward of Breakwaters I, II, and III.

Boat-launch Basin 1995-1996 Accretion

As part of an effort to understand sediment dynamics in the vicinity of Forest Park Beach, the ISGS conducted a bathymetric survey of the Forest Park Beach boat-launch basin in 1995 and again in 1996. The objective was to evaluate the volume of sediment trapped in, or lost from, the basin during a one-year interval, and to determine the areal distribution of accretion and erosion. This work was beyond the requirements of the annual monitoring program, but was done to benefit an overall understanding of the local and regional sediment processes. All prism-pole and fathometer data for 1995 and 1996 are included in Appendix G.

The bathymetric survey in June 1995 was conducted after the Spring 1995 dredging. The subsequent survey in April 1996 was conducted prior to the Spring 1996 dredging. The data comparison thus quantifies accretion (and erosion) that occurred during the storms of fall, winter and early spring between 1995 and 1996.

1995 bathymetry Figure 17 shows the bathymetry in June 1995. The hummocky bottom is interpreted to be a result of different degrees of dredging in different locations. The dredging apparently missed an area in the north-central part of the basin where a 3-ft (0.9-m) contour identifies the crest of a mound-like shoal. In general, the 1995 dredging was effective in creating depths of 6 to 7 ft (1.8 to 2.1 m) in most of the basin. Just outside the boat-launch basin, a shoal area existed adjacent to the south side of the spur that forms the south margin of the boat basin. In June 1995, 4-ft (1.2-m) depths occurred along the entire length of the spur's south face (figs. 17 and 18). 1996 bathymetry indicates that additional shoaling has since occurred (fig. 19).

1996 bathymetry Figure 19 shows the bathymetry in April 1996. A much smoother lake bottom occurs in the boat-launch basin, resulting from accretion and erosion. The major accretion area is along the east side of the basin from the north revetment to the basin entrance. Shoaling along the eastern two-thirds of the entrance had reduced depths from between 6 to 7 ft (1.8 to 2.1 m) in 1995 to 4 to 5 ft (1.2 to 1.5 m) in 1996. Most erosion is associated with the formation of a depression on the west side of the entrance (adjacent to the east tip of the west spur), where depths of more than 9 ft (2.7 m) occur.

Comparison of 1995 and 1996 bathymetry Figure 20 shows the lake-bottom changes between June 1995 and April 1996. This map was made by superimposing the bathymetric data from the two surveys. A negative 3-ft (0.9-m) contour occurs at the area of maximum erosion on the west side of the basin entrance. Erosion also occurred across the southwest corner of the basin and across the top of the mound-like feature present in 1995 in the northern half of the basin (fig. 17). Accretion occurred across the entire lakeward half of the basin and is most pronounced in a band adjacent to the breakwater (Breakwater I). Maximum accretion is about 5 ft.

1995 to 1996 volume change The lake-bottom change map was used to calculate erosion and accretion volumes and net volume change. Two different calculations were done using different boundaries. Calculation I used the zero contour located just south of the basin entrance (fig. 20). This boundary accounts for accretion on the south side of the steel-sheetpile spur that forms the south margin of the basin. Calculation II used a straight line drawn across the basin entrance. This calculation determines volume change only within the basin proper.

I: 1995-1996 Volumetric Change (To zero lake-bottom change contour south of basin entrance)

Accretion	4,280 cu yds	(3,270 cu m)
Erosion	– 570 cu yds	(– 440 cu m)
Net Change	3,710 cu yds	(2,830 cu m)

II: 1995-1996 Volumetric Change (To limit of straight line across the basin entrance)

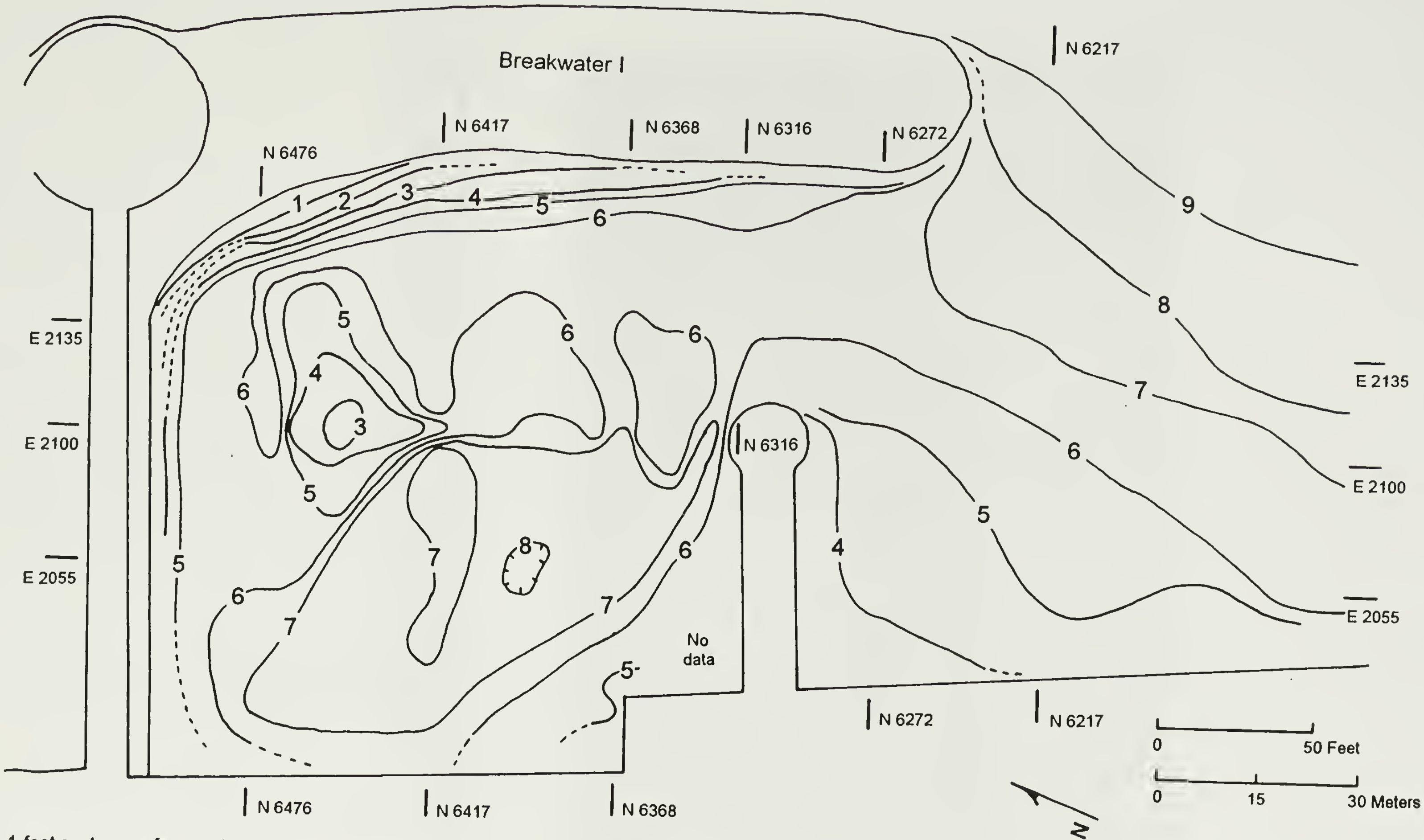
Accretion	3,780 cu yds	(2,890 cu m)
Erosion	– 540 cu yds	(– 410 cu m)
Net Change	3,240 cu yds	(2,480 cu m)

Implications for sediment transport The pattern of lake-bottom change within the boat-launch basin suggests that a current gyre develops in the basin during storms, with strong currents entering on the west side of the entrance and then circulating clockwise to exit as a weaker current on the east side of the basin. This clockwise rotation is suggested by: 1) the overall pattern of erosional areas in the western part of the basin where inflowing currents are strong and can erode and transport sediment; and 2) the overall narrow, north-south orientation of the large accretional band along the breakwater which likely results from currents slowing and losing sediment-carrying capacity, resulting in deposition.

Detailed sediment and current studies would be needed to determine the source of this sediment that has accreted along Breakwater I. However, based on the understanding of the overall sediment accretion and erosion patterns at Forest Park Beach, it is reasonable to assume that this is sediment derived from the north and is part of the natural bypass of Forest Park Beach. Waves from the northeast quadrant likely bring this sediment onto the lake bottom south of the boat-launch basin. The sediment is then moved into the basin by waves from the southeast quadrant. The pattern of erosion and accretion within the basin is also consistent with the net influence of southeasterly waves. The erosional areas occur where the basin is exposed to these waves; the accretional area is in a shadow zone to these waves as a result of protection by Breakwater I.

An additional source of sediment supplied to the basin could be by wave surge pushing sand through the breakwater (Breakwater I). This breakwater is porous, and at several of the breakwaters at Forest Park Beach the influence of surge action coming through the breakwaters is indicated by accretion or erosion on the landward side of the breakwaters. If this is a sediment source to the basin accretion, it is likely a minor component compared to that transported through the basin entrance.

Bathymetry: June 27, 1995 (post- 1995 dredging)



1-foot contours referenced to Lake Forest Datum (LFD)
Bathymetric data collected by prism pole and fathometer

Ticks Indicate profile locations
(Illinois State Plane Coordinates)

Figure 17 Bathymetry of the Forest Park Beach boat-launch basin in June 1995 (post-1995 dredging).

Figure 18 Shoaling on the south side of the spur that forms the south side of the boat-launch basin was sufficient by June 1995 to allow wading out to near the distal end of the spur. Subsequent mapping of this area in April 1996 determined additional shoaling (photo date: June 22, 1995).

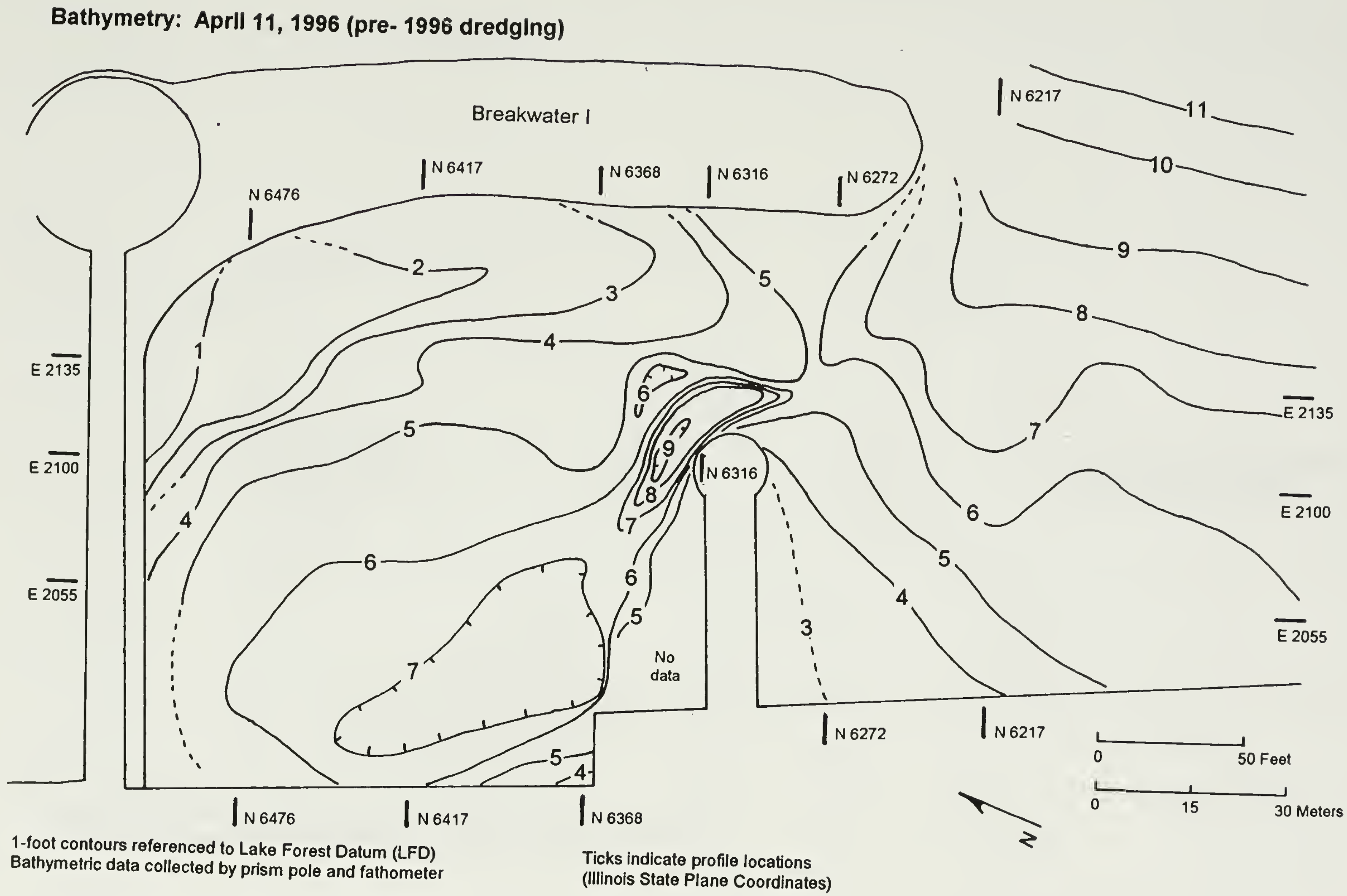
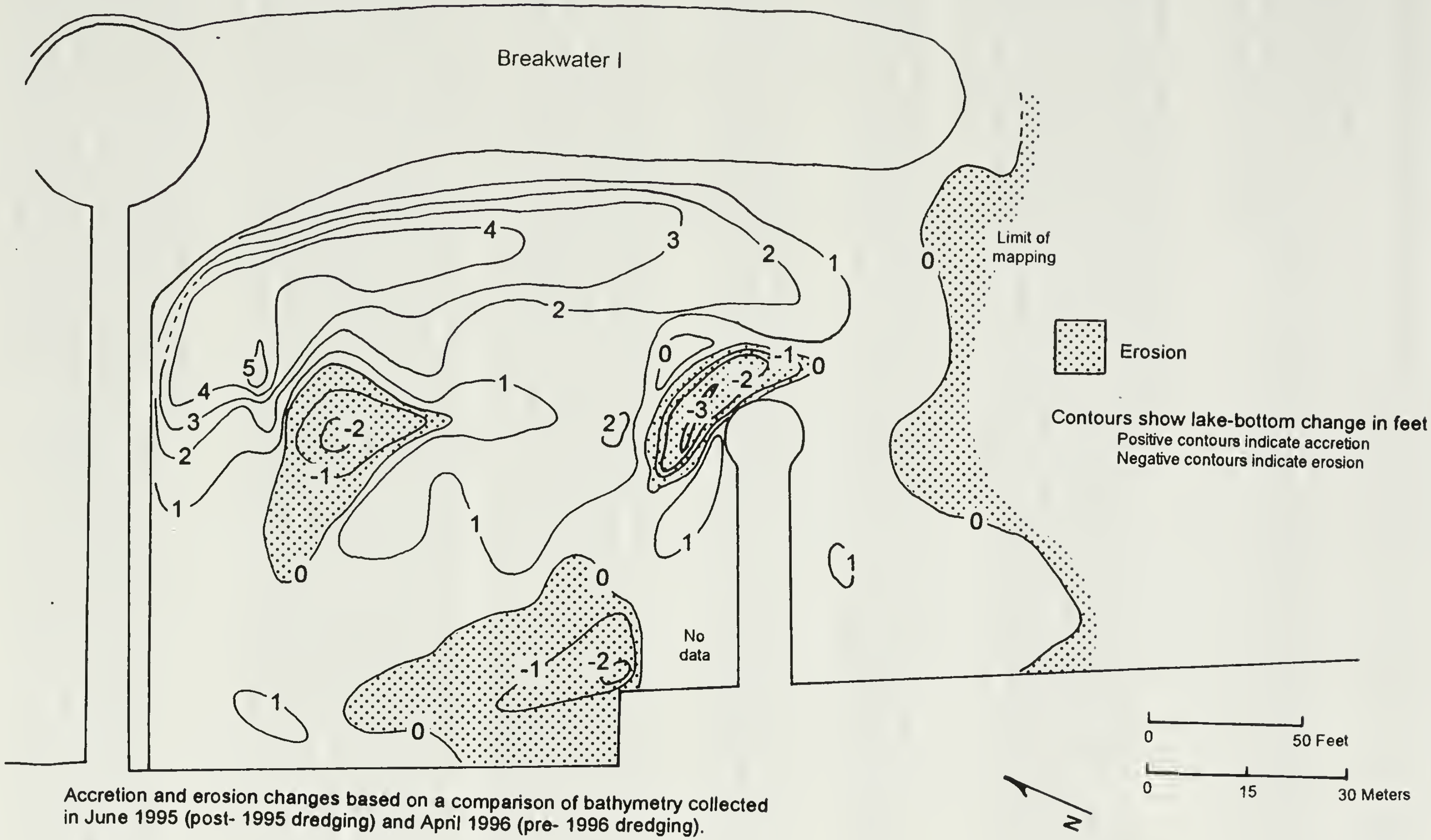


Figure 19 Bathymetry of the Forest Park Beach boat-launch basin in April 1996 (pre-1996 dredging).

Lake-bottom changes: June 1995 - April 1996



Accretion and erosion changes based on a comparison of bathymetry collected in June 1995 (post- 1995 dredging) and April 1996 (pre- 1996 dredging).

Figure 20 Lake-bottom changes in Forest Park Beach boat-launch basin between June 1995 and April 1996.

PART 2: COASTAL PROCESSES AND IMPACTS

OVERVIEW OF COASTAL IMPACTS SINCE CONSTRUCTION OF FOREST PARK BEACH

General Statement

The coastal monitoring data collected at Forest Park Beach in 1995 completes the second of two monitoring programs at the facility. By combining data from the two monitoring programs, it is possible to evaluate beach and lake-bottom change in the vicinity of Forest Park Beach for the eight years following construction (1987 to 1995).

Long-term Changes in the Sand/Clay Interface

One of the reasons for including mapping of the sand/clay interface as part of the monitoring program was to determine when and where landward or lakeward shifts occur that indicate loss or gain of lake-bottom sand. The summary of annual sand/clay interface locations shown in figure 15 illustrates that, between 1988 and 1991, the interface moved lakeward along the entire Forest Park Beach facility. This lakeward shift is interpreted as the establishment of a pathway for natural sand bypass of the facility, and it is one of several lines of evidence indicating that natural bypass of Forest Park Beach occurred early in the post-construction history.

The location of the interface varied little in the northern part of the monitoring area between 1986 and 1995 (north of Breakwater IV)(fig. 15). In the southern part of the monitoring area, changes have been substantial in two different areas, one area having an overall lakeward shift, the other area having a landward shift.

The lakeward shift occurred lakeward of Breakwaters I, II, and III and Beach Cells 3 and 4 and is accompanied by a shift southward (downdrift). These changes are interpreted as related to the infilling of a lake-bottom depression as well as the southward advance of the leading edge of sediment accretion on the lakeward side of the facility.

The landward shift of the interface occurred from Breakwater I southward to just south of Forest Park Beach. At first consideration, this landward shift might be interpreted as resulting from a depletion of sand due to blockage by Forest Park Beach. At the very southern end of the monitoring area, however, the interface has been essentially stable from 1986 through 1995. The one exception occurred in 1991, but this is likely an artifact of procedures for diver mapping first used in 1991 and improved in subsequent years (CH2M HILL, 1992; Magnus, 1993a, b; Magnus et al, 1994; Magnus, Hammer, and Miller, 1996).

The conclusion drawn from this long-term record (1986-1995) for the location of the sand/clay interface is that loss of lake-bottom sand cover has been limited to a localized area off the southern end of Forest Park Beach. A short distance southward (downdrift) at the southern end of the monitoring area, no landward shift has occurred. Natural bypass is certain southward around the facility to Breakwater I. The stability of the sand cover at the southern end of the monitoring area suggests that this area is receiving a sand supply from the north (updrift). Thus, a possible explanation for the trends is that southward transport of littoral sand is continuous through the monitoring area. The area off the southern part of Forest Park Beach, however, may be an area of complex wave and current dynamics that, at least since 1991, have prevented any net gain of sand.

Long-term (1987-1995) Lake-bottom Changes

Figures 21, 22, and 23 provide a time series comparison of lake-bottom changes for different intervals through the eight years of post-construction monitoring. This time series is for 1987-1988, 1988-1992, and 1992-1995. Each of these maps shows lake-bottom changes greater than 1 ft (0.9 m). Comparison of the maps shows that in the short term, the lake bottom has been very dynamic in terms of the location and the degree of accretion or erosion. This dynamic nature makes long-term comparisons more useful for identifying significant lake-bottom changes.

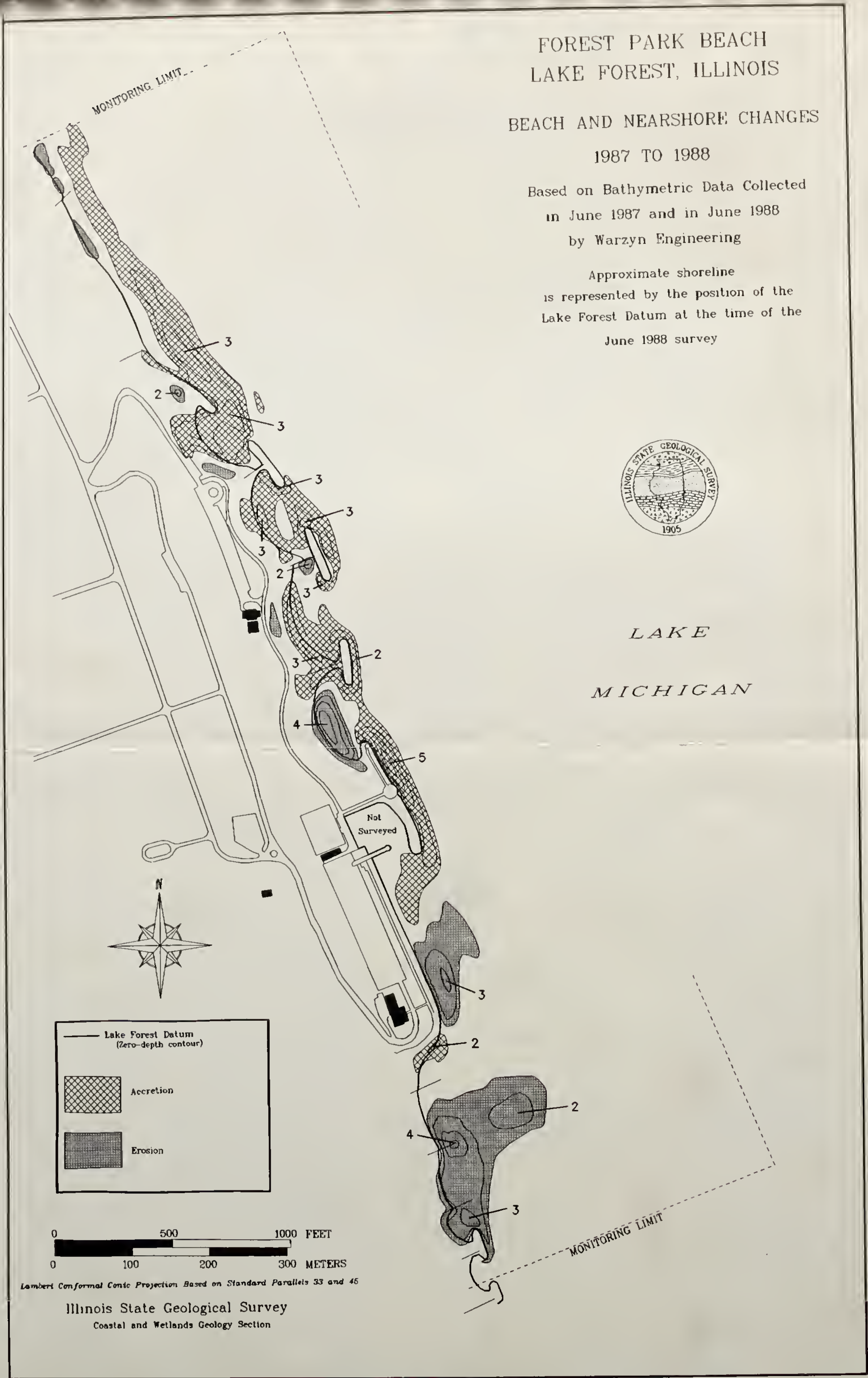


Figure 21 Beach and nearshore changes from 1987 to 1988. Only those changes greater than 1 ft are shown.

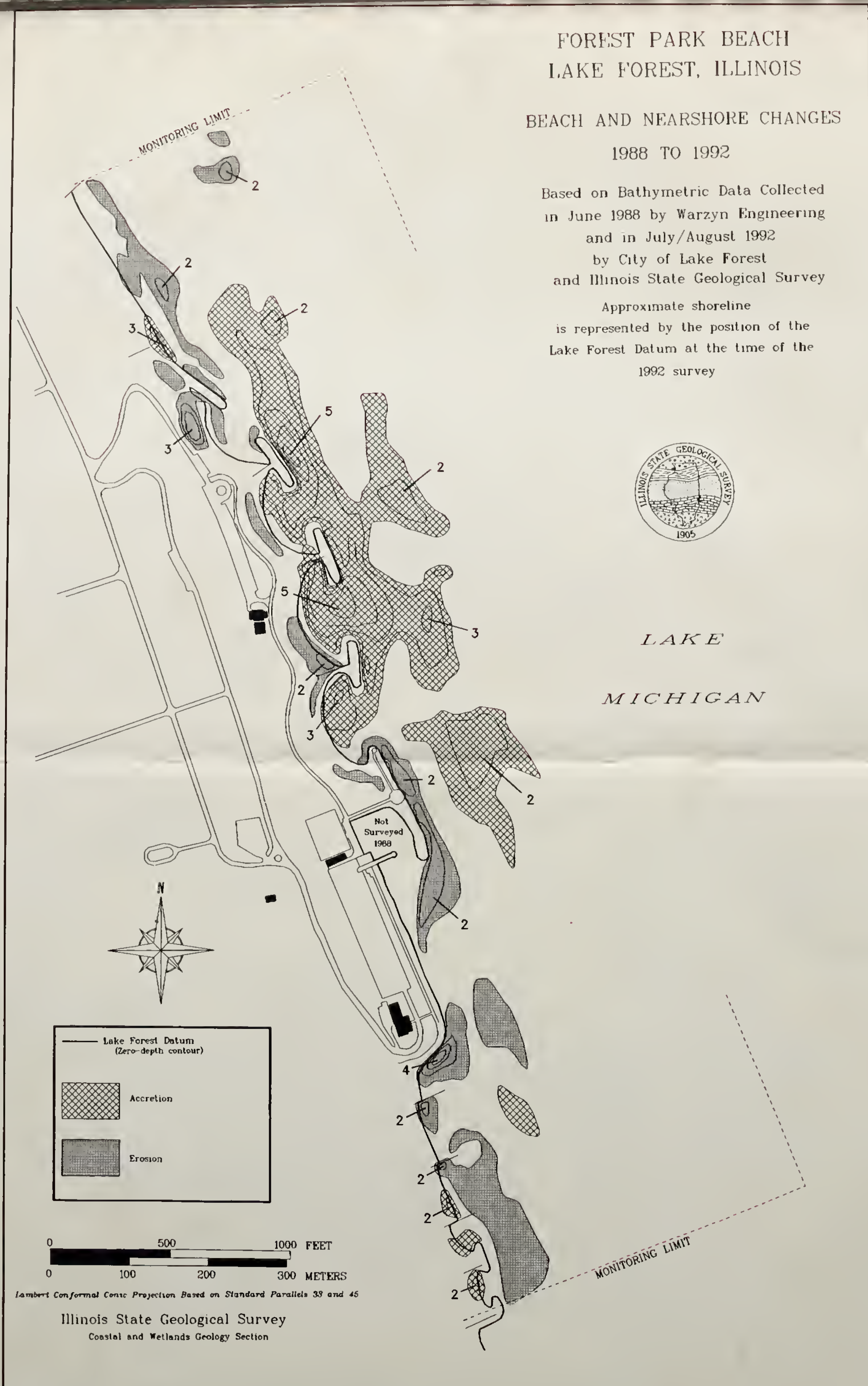


Figure 22 Beach and nearshore changes from 1988 to 1992. Only those changes greater than 1 ft are shown.

Figure 23 Beach and nearshore changes from 1992 to 1995. Only those changes greater than 1 ft are shown.

Figure 24 shows the net lake-bottom change (1987 and 1995) since construction of Forest Park Beach. Accretional areas dominate and extend along the beach updrift of the north breakwater, in all of the beach cells, and across the lake bottom on the lakeward perimeter of the facility as far south as Breakwater I. Accretion exceeding 3 ft (0.9 m) has occurred in all four beach cells and along the lakeward margin of all the intervening breakwaters. An accretional area also occurs extending southward from the end of Breakwater I. This feature is interpreted as the southern end of the sand bridge that has developed for natural bypass of the facility. Net erosion has occurred across the beaches in Beach Cells 1, 3, and 4. Some of these beach erosional areas are beyond the limits of typical storm waves, and thus a factor in the beach lowering is apparently regrading done as part of beach maintenance. Another area of net erosion is the lake-bottom along the southern margin of Forest Park Beach, and opposite the lakeshore properties immediately downdrift from the facility. Maximum erosion exceeds 3 ft (0.9 m) lakeward of these downdrift properties and along riprap on the southern margin of Forest Park Beach.

Long-term (1987-1995) Accretion and Erosion Volumes

Data from the bathymetric surveys done in 1987 and 1988 as part of the initial monitoring program (Lake Forest Shoreline Monitoring Committee 1990a, b), combined with data obtained during the secondary monitoring program done from 1991 through 1995, provides a means of evaluating long-term lake-bottom changes for the eight-year record of post-construction history from 1987 though 1995. Differences in the quality of the bathymetric data require that the volumetric changes be computed based on a 1-ft threshold for 1987 to 1992, because these data rely on fathometer surveys and inconsistent methods of offshore position control. A zero-ft threshold was used from 1992 to 1995, because these data are derived from a more precise total-station and prism-pole survey.

Table 7 lists the total accretion and total erosion for each of the five zones used in the volumetric calculations. This allows an annual comparison of separate accretion and erosion trends to be made for each of the areas. Table 7 is essentially an expanded version of table 6. The greatest annual accretion occurred during 1993-1994 in the updrift, lakeward perimeter, southern lakeward perimeter, and downdrift zones. The one exception to this trend of maximum accretion in 1993-1994 occurred in the beach cells, which had the greatest annual accretion in 1987-1988, the first year after the facility was completed. The greatest annual erosion occurred during 1994-1995 in the lakeward perimeter, southern lakeward perimeter, and downdrift zones. The two exceptions to this trend of maximum erosion in 1994-1995 were the updrift and beach-cell zones, both of which experienced maximum annual erosion in 1992-1993.

Table 8 combines the accretion and erosion volumes to provide the net change for each of the five areas. In any given temporal interval between 1987 and 1993 (the first six years since project completion), some areas had net accretion and some had net erosion. In contrast, all areas had net accretion in 1993-1994, and all areas had net erosion in 1994-1995.

The summation for the 1987-1995 record results in a net accretion for the entire monitoring area of 45,800 cu yd (35,000 cu m). Net accretion occurred in the updrift zone (9,200 cu yd; 7,000 cu m), in the beach-cell zone (11,100 cu yd; 8,500 cu m), and in the lakeward perimeter zone (39,800 cu yd; 30,400 cu m). Net erosion occurred in the southern lakeward perimeter zone (8,000 cu yd; 6,100 cu m) and in the downdrift zone (6,300 cu yd; 4,800 cu m).

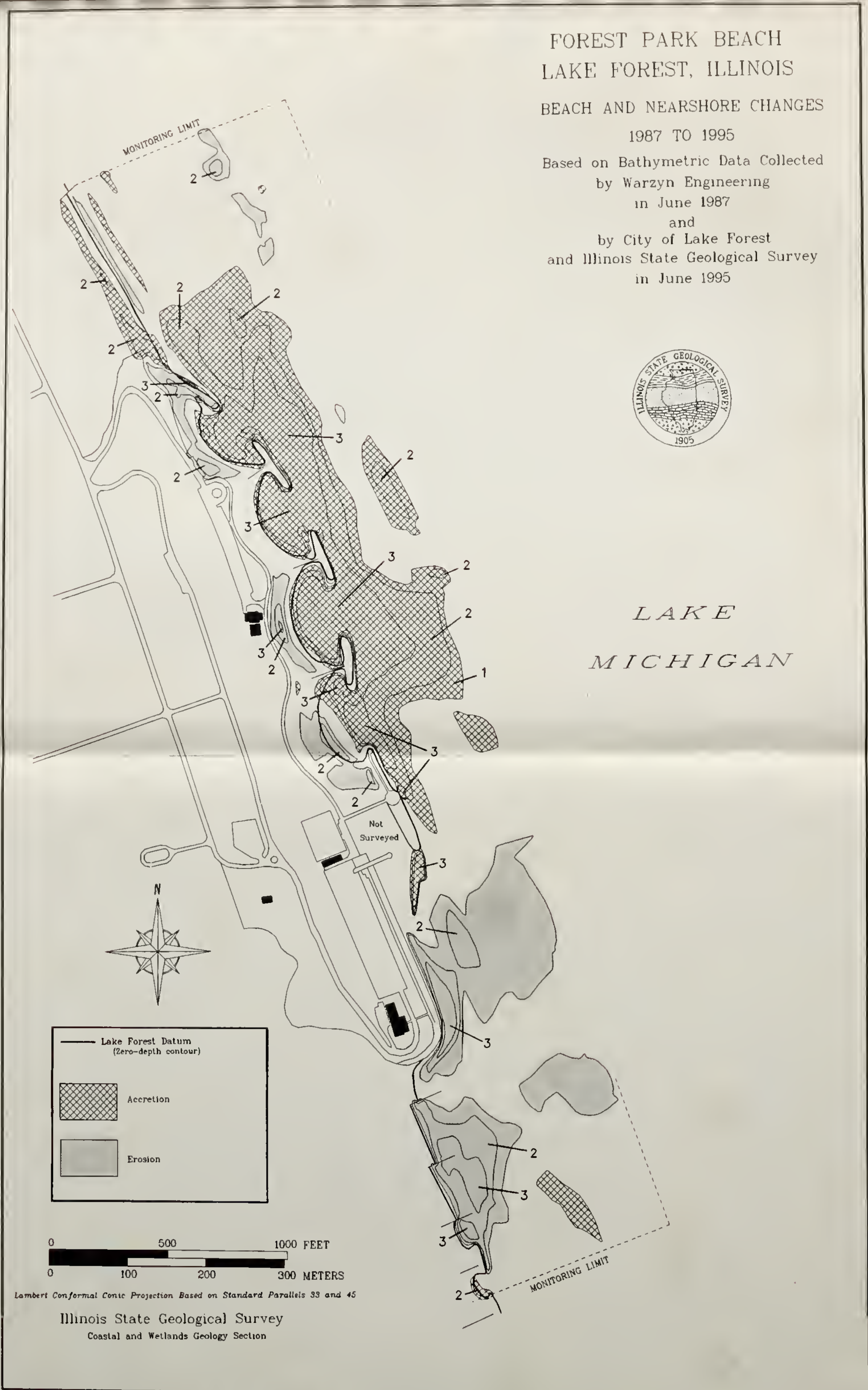


Figure 24 Long-term record of beach and nearshore changes from 1987 to 1995 (first eight years following construction of Forest Park Beach). Only those changes greater than 1 ft (0.3 m) are shown.

Table 7 Summary of annual accretion and erosion within the different zones of the Forest Park Beach monitoring area. The threshold is 1 ft (0.3 m) for the volumes computed for 1987-1988 and 1988-1992. A 0-ft threshold is used for each of the three comparisons from 1992 to 1995. Units are cu yd. Calculations are rounded to the nearest 100 cu yd.

Zone	1987-1988	1988-1992 (4-yr total)	1988-1992 (average per year)	1992-1993	1993-1994	1994-1995
Accretion						
Updrift	3,300	900	200	3,800	9,600	1,600
Beach cells	7,000	8,100	2,000	.. 3,200	6,100	4,200
Lakeward perimeter	7,600	23,600	5,900	6,600	11,200	4,400
Southern lakeward perimeter	1,300	900	200	1,500	7,000	1,400
Downdrift	100	200	50	5,300	10,400	900
Total	19,300	33,700	8,350	20,400	44,300	12,500
Erosion						
Zone	1987-1988	1988-1992 (4-yr total)	1988-1992 (average per year)	1992-1993	1993-1994	1994-1995
Updrift	0	1,500	400	4,100	800	3,600
Beach cells	2,600	2,500	600	5,500	1,500	5,400
Lakeward perimeter	0	900	200	4,000	1,600	7,100
Southern lakeward perimeter	1,800	2,200	600	6,500	600	9,000
Downdrift	7,400	3,200	800	1,400	600	10,600
Total	11,800	10,300	2,600	21,500	5,100	35,700

Table 8 Summary of net lake-bottom change within different zones of the Forest Park Beach monitoring area based on erosion/accretion data presented in table 7. The threshold is 1 ft (0.3 m) for the volumes computed for 1987-1988 and 1988-1992. A 0-ft threshold is used for each of the three comparisons from 1992 to 1995. Units are cu yd. Calculations are rounded to the nearest 100 cu yd. Negative numbers (bold highlighted) indicate net erosion.

Zone	1987-88	1988-92	1988-92 (average per year)	1992-93	1993-94	1994-95	1987-95 (total)
Updrift	3,300	**–600**	**–200**	**–300**	8,800	**–2,000**	9,200
Beach cells	4,400	5,600	1,400	**–2,300**	4,600	**–1,200**	11,100
Lakeward perimeter	7,600	22,700	5,700	2,600	9,600	**–2,700**	39,800
Southern lakeward perimeter	**–500**	**–1,300**	**–400**	**–5,000**	6,400	**–7,600**	**–8,000**
Downdrift	**–7,300**	**–3,000**	**–700**	3,900	9,800	**–9,700**	**–6,300**
Total	7,500	23,400	5,800	**–1,100**	39,200	**–23,200**	45,800

Implications of the Long-term (1987-1995) Accretion and Erosion Trends

Caution is needed when interpreting trends in the accretion and erosion volumes because, prior to the 1992-1993 comparison, a 1-ft (0.3-m) threshold was used, and thus all accretion and erosion changes totaling less than 1 ft (0.3 m) are not included in the calculations. An additional limitation is that the 1988-1992 comparison is a summary of four years, and thus the annual fluctuation is based on a four-year average. With these limitations in mind, the following implications are drawn:

1) The 1987-1995 record is one of net updrift accretion (all beach and lake bottom areas north of Breakwater I), and net downdrift erosion (south of Breakwater I).

2) A simplified conceptual model describing how Forest Park Beach interacts with the littoral stream is as follows: A continual stream of littoral sand approaches from updrift with part being trapped along the updrift area of the facility, while the downdrift area experiences net erosion because littoral sediment is deprived. In reality, the accretion and erosion trends are more complex, as evidenced by the net erosion in the 1994-1995 comparison. Between 1987 and 1995 each of the zones has experienced both net accretion and net erosion. The beach and nearshore are dynamic and quick to respond to fluctuations in wave climate, lake level, and flux of littoral sediment moving southward along the shore.

3) Any changes should not be considered as permanent, because the sediment is susceptible to movement due to fluctuations in wave climate and sediment supply. For example, the 1987-1994 net accretion was 69,000 cu yd (52,800 cu m), while net erosion across all five areas between 1994 and 1995 decreased the 1987-1995 net accretion to 45,800 cu yd (35,000 cu m).

Entrapment at the Boat-launch Basin

Dredging was implemented at the boat-launch basin in 1989, two years after project completion. Maintenance dredging has since occurred yearly and can be anticipated to continue as long a supply of littoral sediment is moving south along the lakeward perimeter of the facility. As discussed in the previous

section concerning the 1995-1996 bathymetric changes in the basin, the accretion and erosion pattern suggests a net clockwise circulation of currents within the basin.

Table 9 summarizes the annual dredge volumes for 1989 through 1995. For the seven years of record, the average annual dredge volume is 3,206 cu yd/yr (2,450 cu m/yr). All of the dredged volume is disposed of in the nearshore downdrift of Forest Park Beach, and thus no net loss of sediment occurs in the littoral stream.

Possible Sources for Entrapped Littoral Sediment

In the planning and design phases for Forest Park Beach, the best available data suggested that the volume of littoral sediment in transport along the beach and nearshore at the project site was "lean", possibly no more than a few thousand cubic yards. The reason for limited available sediment was attributed to updrift barriers to littoral transport (fig. 25), specifically the harbor at Great Lakes Naval Training Center, located 3.5 miles (5.6 km) updrift of Forest Park Beach. Entrapment of sediment on the updrift side of the harbor as well as inside the harbor had been documented since the harbor breakwaters were constructed in 1923. Waukegan Harbor (located 6.5 miles (10.5 km) updrift of Forest Park Beach) was also considered a major barrier limiting littoral sediment supply to the Lake Forest area because the jetties and entrance channel for Waukegan Harbor form a near-total entrapment area. A possible input of sediment for the littoral stream passing Forest Park Beach was erosion of the bluffs, beaches and nearshore along the 3.5-mile (5.6-km) reach between Great Lakes Harbor and Forest Park Beach. Most of this reach, however, has an armored shore that limits available sediment input from beach and bluff erosion. Data on thickness of sand cover across the nearshore between Great Lakes Harbor and Lake Forest indicated that this was a patchy and relatively thin sand cover, no more than about 5 ft (1.5 m) in maximum thickness (Norby, 1981).

Table 9 Dredge volumes for Forest Park Beach boat-launch basin[1].

Year	Dredge Volume (cubic yards)
1989	1,845
1990	4,975
1991	1,800
1992	3,600
1993	2,600
1994	2,100
1995	5,520
Summation	22,440
Seven-year Average Annual Volume	3,206

[1]Data provided by City of Lake Forest.

The fact that entrapment of a minimum of 10,000 cu yd (7,600 cu m) of sand was documented within one year of completion of Forest Park Beach clearly indicates that the updrift littoral sediment supply was greater than anticipated. Questions arose concerning the source of this sand.

The northern limits of the Forest Park Beach monitoring area do not extend updrift far enough to adequately evaluate the issue of this sand supply. Recent data compilations for the U.S. Army Corps of Engineers Interim IV Study, however, provide new insights into the updrift littoral sediment dynamics. This study concerns ongoing and long-term coastal erosion and accretion along the 22 miles (35 km) of Illinois lakeshore from Waukegan Harbor southward to Wilmette Harbor. As part of the Interim IV Study, the ISGS was contracted to compile and evaluate data related to the coastal geology and coastal processes along this reach. This work is summarized in a report by Chrzastowski and Trask (1995). The U.S. Geological Survey (USGS) was also contracted to conduct mapping of lake-bottom sand distribution and thickness.

Two important findings from this work by ISGS and USGS directly relate to the issue of littoral sand supply reaching Forest Park Beach.

> Great Lakes Harbor: A time series comparing bathymetric maps of the harbor for 1923, 1954, and 1976 documents a decreasing rate of sediment entrapment in the harbor. By 1974 the harbor basin had essentially reached entrapment capacity. Total infilling did not occur, but wave, current and other sediment-transport dynamics apparently prevented any major addition to the entrapment subsequent to 1974. The rate of harbor entrapment had been as high as 22,100 cu yd/yr (16,900 cu m/yr) between 1923 and 1954, but diminished to 5,500 cu yd/yr (4,200 cu m/yr) between 1976 and 1992. As discussed below, this was a time when the updrift supply of littoral sediment had increased from previous years. Thus, littoral sediment supply approaching the harbor from updrift was bypassing Great Lakes Harbor. A wedge of accretion along the lakeward side of the breakwaters indicated by comparing 1910 and 1974 bathymetry documents that a sand bridge for natural bypass of the harbor was in place at least by 1974 (Chrzastowski and Trask, 1995).

> Waukegan Harbor: The sand accretion on the updrift side of the harbor jetties has produced one of the largest human-induced entrapments in southern Lake Michigan. Limited natural bypass of Waukegan Harbor has been documented (Krumbein and Ohsiek, 1950; Chrzastowski and Trask, 1995). However, the dredged channel for the harbor has been a major sediment trap. Dredging of this channel prior to 1977 involved deep-water disposal 2.5 miles (4 km) offshore, thus permanently removing this sediment from the littoral stream. In 1977, however, and then consistently since 1984, all dredging has involved artificial bypass to a downdrift, nearshore disposal site about 2000 ft (610 m) south of Waukegan Harbor. From here the sediment is transported southward as part of the littoral stream. Based on the dredge volumes for 1984-1994, the 10-year average annual contribution to the littoral stream has been 44,900 cu yd/yr (34,300 cu m/yr) (Chrzastowski and Trask, 1995).

The combined factors of artificial bypass at Waukegan Harbor and natural bypass at Great Lakes Harbor have provided an updrift littoral sediment supply that has been available for entrapment at Forest Park Beach since the facility was constructed. Sand supply approaching Forest Park Beach could also be derived from: 1) natural bypass of Waukegan Harbor; 2) nearshore erosion between Waukegan and Great Lakes Harbor; and 3) erosion between Great Lakes Harbor and Forest Park Beach. However, considering just the 1984-1994 average annual artificial bypass at Waukegan Harbor of about 45,000 cu yd/yr (34,400 cu m/yr) and assuming that the majority of this volume is transported southward to Lake Forest, this volume is sufficient to account for the annual net accretion documented at Forest Park Beach.

Conclusion Regarding Entrapment of Littoral Sediment
There is a two-fold reason why no significant littoral sediment entrapment was anticipated at Forest Park Beach in the planning and design phases:

1) Data had not been compiled and evaluated to demonstrate that Great Lakes Harbor was no longer a major sediment trap and that natural bypass of the harbor was occurring.

2) The artificial bypass occurring at Waukegan Harbor was not recognized as a potential sediment supply to the littoral stream reaching Forest Park Beach.

The limitations on the possible sources of littoral sediment for accumulation at Forest Park Beach strongly point to the artificial bypass at Waukegan Harbor as a primary sediment source. If this bypass is curtailed, or if the bypass disposal area is shifted to the south of Forest Park Beach, it is likely that with time the annual accretion at Forest Park Beach will decline and possibly be eliminated.

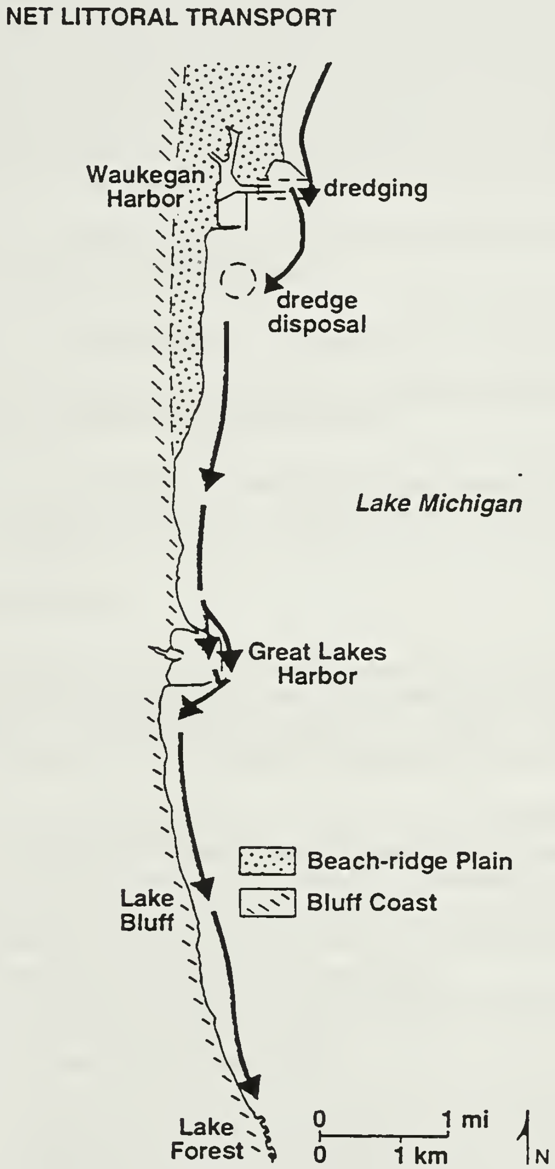


Figure 25 Map of the Illinois lakeshore between Waukegan Harbor and Forest Park Beach showing the likely pathway for littoral sediment to reach Forest Park Beach.

PART 3: SUMMARY

RECOMMENDATIONS FOR COASTAL MONITORING BEYOND 1995

The data collection in summer 1995 was the final annual data collection in this five-year monitoring program that began in 1991. Based on the wide variation in net lake-bottom change between 1993-1994 and 1994-1995, it is reasonable to assume that the lake-bottom changes in the vicinity of Forest Park Beach did not reach equilibrium conditions as of 1995. Additional beach and nearshore changes can be expected in the coming years, although it is uncertain if the net annual changes will be erosion or accretion. Continued annual monitoring of beach and lake-bottom changes is warranted for the sake of quantifying any adverse erosion or accretion trends as they develop. It is not suggested that the City of Lake Forest conduct any additional formal monitoring. Rather, this monitoring would be done by a university coastal-research team or the Illinois State Geological Survey (ISGS). The monitoring near Forest Park Beach would be part of a continuing effort to evaluate coastal management issues between Waukegan and Wilmette, which is the Corps of Engineers Interim IV study area. A less rigorous monitoring scheme than that used in the 1991-1995 monitoring could be developed. Several key issues deserve evaluation:

1) continue to monitor changes within the beach cells to determine to what degree, if any, these are acting as sediment traps;

2) continue to monitor lake-bottom changes that are related to sand bypass of the facility;

3) conduct annual spring surveys within the boat-launch basin to determine to what degree this basin is annually trapping littoral sand;

4) continue to make regular inspections of lakeshore properties downdrift of Forest Park Beach to assure that any adverse changes to the beaches or instability of shore structures can be identified.

GENERAL RECOMMENDATIONS

1) Dredging is not recommended for any of the accretion in the beach cells or on the lakeward perimeter of the facility. This accretion is part of the sand bridge for natural bypass of sand around Forest Park Beach. If the sediment is dredged, the volume of natural bypass will decrease as sediment accretion occurs in the dredged areas to reestablish the bypass pathway.

2) Following the first of the two monitoring programs at Forest Park Beach, the City of Lake Forest was required to provide downdrift beach nourishment to compensate for the approximate 10,000 cu yd (7,600 cu m) that had been documented as accretion in an updrift bar. If debate ensues concerning mitigation for the net accretion of 60,100 cu yd (45,900 cu m) updrift of Breakwater I that is documented now at the end of the second monitoring program, several aspects of the dynamics of the sand accretion should be considered:
    - a) The accretion that has occurred should not be considered permanent. If the sediment supply from updrift is curtailed, much of this accretion can be eroded and reenter the littoral stream;
    - b) The net accretion in the monitoring area has been quite variable depending on when it was computed. For example, in 1994 the seven-year net accretion (1987-1994) totaled 69,000 cu yd (52,800 cu m); in 1995 the eight-year net accretion (1987-1995) totaled 45,800 cu yd (35,000 cu m). The difference resulted from net erosion across much of the monitoring area between 1994 and 1995. It is not possible to predict whether the net accretion will increase, decrease, or remain relatively constant in the future.

3) Monitoring at a limited scale should be continued by the U.S. Army Corps of Engineers or the Illinois Department of Natural Resources until the littoral processes at Forest Park Beach are better understood or the monitoring area reaches equilibrium.

4) Additional sand samples should be collected to map grain-size distribution and determine the character of the sand being trapped by the facility.

CONCLUSIONS FOR THE 1995 (YEAR-5) MONITORING

The 1995 data collection at Forest Park Beach is the fifth year of a five-year annual monitoring program that began in 1991. Completion of the 1995 monitoring concludes the five years of the 1991-1995 coastal monitoring at Forest Park Beach that was required by the U.S. Army Corps of Engineers Chicago District. The post-construction coastal impacts of this facility are summarized and evaluated in the subsequent conclusion section. The conclusions summarized here relate to the 1995 data collection and analysis.

The role of the ISGS during the 1995 monitoring was that of an independent reviewer of the data collection and data presentation by the City of Lake Forest. The 1995 ISGS data collection and data processing also provided supplemental information to complement the 1995 work done by the City of Lake Forest. The following conclusions are drawn from the 1995 review and study by ISGS:

1. Prism-pole profile data collected by the City of Lake Forest in 1995 were verified by the ISGS as being accurate, reproducible, and valid for comparison against any possible future monitoring data and data sets collected in the past. Based on comparisons with ISGS fathometer data, and cross checks with ISGS and City of Lake Forest prism-pole data, the fathometer data collected by a consultant for the City of Lake Forest has a persistent vertical error in the range 0.75 to 0.8 ft. These fathometer data cover the long lines of the monitoring scheme required by the U.S. Army Corps of Engineers A correction can be applied to this data for future use. Alternatively, ISGS fathometer data can be used instead. The inaccuracy of the fathometer data is not critical to the monitoring program because this fathometer data is used primarily for survey coverage across the lake-bottom till. The area of sand accretion and erosion occurs landward of the sand/clay interface and is covered by prism-pole data.

2. No change in position of the sand/clay interface occurred between 1994 and 1995. This is the first time that no change in position has been recorded since mapping of the interface began in 1986. Although net erosion dominated the monitoring area between 1994 and 1995, this erosion did not reduce the total area of nearshore sand cover.

3. Comparisons of topographic and bathymetric data collected in 1994 and 1995 (fig. 13) indicate that beach and lake-bottom accretion greater than 1 ft occurred (1) within Beach Cells 1, 2, and 3, (2) on the beach of Beach Cells 2 and 3, (3) in a series of patchy, localized accretional areas lakeward of each of the breakwaters, and (4) on the updrift beach. Erosion greater than 1 ft occurred (1) on the beach and in the shallow nearshore on the updrift side of Breakwater VI, (2) in small, localized patches in the beach cells and marginal to all breakwaters, (3) on the beach in Beach Cell 4, (4) across a bypass "sand bridge" just south of the boat-launch basin, and (5) in the shallow nearshore within each of the groin fields in the south (downdrift) end of the monitoring area.

4. A survey of the bathymetry of the boat-launch basin in June 1995 (after the 1995 dredging) and in April 1996 (prior to the 1996 dredging) provided a means to examine the accretion and erosion patterns in the basin during one year, and to compute erosion, accretion, and net volume change. Erosional areas occurred (1) wrapping around the north side of the spur that forms the south side of the basin, (2) in the southwestern part of the basin, and (3) across a former shoal area in the north central part of the basin. Accretion occurred in a lobate form along all of the basin side of Breakwater I. Maximum erosion exceeded 3 ft; maximum accretion exceeded 5 ft. The net

change within the basin (inside a line across the basin entrance) was accretion of 3,240 cu yd (2,480 cu m).

5. Volumetric calculations of 1994-1995 accretion and erosion in the monitoring area were reported by the City of Lake Forest (work performed by W. F. Baird & Associates, Ltd.). Independent ISGS volume calculations are in relatively close agreement. When the common areas in the two analyses are compared (table 5), erosion was the net change across the monitoring area between 1994 and 1995. For a 0-ft threshold (i.e., all changes greater than 0 ft) and rounded to the nearest 100 cu yd (cu m), the 1994-1995 estimates of net erosion are as follows:

ISGS:	–15,600 cu yd (–11,900 cu m)
City of Lake Forest:	–18,800 cu yd (–14,400 cu m)

This is a difference of 17%. It is important to note that these figures do not include the volume change across the lake bottom from the north end of Breakwater I to the south end of the southern revetment (i.e., between profiles N6550 and N5617). The original monitoring plans approved by the U.S. Army Corps of Engineers did not require monitoring across this area.

6. Based on the 1994-1995 volumetric calculations by the ISGS using a 0-ft threshold and the 15-ft contour as a lakeward boundary (tables 4 and 5), the volume changes for the entire monitoring area (rounded to the nearest 100 cu yd and cu m) are as follows:

Net Accretion:	
Updrift Zone	1,600 cu yd (1,200 cu m)
Beach Cells	4,200 cu yd (3,200 cu m)
Lakeward Perimeter	4,400 cu yd (3,400 cu m)
Southern Lakeward Perimeter	1,400 cu yd (1,100 cu m)
Downdrift Zone	900 cu yd (700 cu m)
Net Erosion:	
Updrift Zone	3,600 cu yd (2,800 cu m)
Beach Cells	5,400 cu yd (4,100 cu m)
Lakeward Perimeter	7,100 cu yd (5,400 cu m)
Southern Lakeward Perimeter	9,000 cu yd (6,900 cu m)
Downdrift Zone	10,600 cu yd (8,100 cu m)

7. The volumes computed by ISGS include the area between profiles N6550 and N5617 (ISGS Southern Lakeward Perimeter); thus the summation of these volumes provides a complete documentation of 1994-1995 net change in the entire monitoring area. The summation of net changes in conclusion 6 results in a 1994-1995 net erosion of 23,200 cu yd (17,700 cu m).

8. The 1994-1995 net erosion of 23,200 cu yd (17,700 cu m) is the largest net erosion documented for any 1-year interval since the present monitoring program began. This follows the 1993-1994 net accretion of 39,000 cu yd (29,800 cu m), which was the largest 1-year accretion documented. These annual changes attest to the dynamics of the coastal sand system in the monitoring area, and how accretion and erosion trends can fluctuate on a short-term basis.

9. The net erosion that occurred in 1994-1995 attests to the temporary nature of accretion in the monitoring area. The net accretion in 1993-1994 likely represents entrapment of sediment as an abundance of littoral sediment was moving through the littoral stream in a pulse-like manner. The net erosion in 1994-1995 may have been a response to a reduced volume of sediment in the littoral stream.

CONCLUSIONS FOR THE 1987 TO 1995 COASTAL MONITORING

As of 1995, two different monitoring programs have been completed at Forest Park Beach. The first was based on data collected in 1987 and 1988 (Lake Forest Shoreline Monitoring Committee, 1990a, b). The second was based on data collected from 1991 through 1995 (CH2M HILL, 1992; Chrzastowski and Trask, 1992, 1994, and this volume; Magnus, 1993; Magnus et. al 1994; Magnus, Hammer, and Miller 1996; Trask and Chrzastowski, 1993, 1995). The following summarizes conclusions based on a synthesis of all data collected in both monitoring programs, and thus this is an evaluation of the net coastal impacts during eight years following construction.

1. Since its completion in 1987, the Forest Park Beach facility has been a partial barrier to the southward transport of littoral sand. Within the monitoring area, between 1987 and 1995 there has been net accretion on the beaches and in the nearshore as far south as just south of Breakwater I. Net erosion has dominated the lake bottom south of this location. The 1987-1995 net lake-bottom change is accretion of 45,800 cu yds (table 6). This does not account for any net change that occurred between either 1987 and 1988 or between 1988 and 1992 that was less than one foot in thickness.

2. The City of Lake Forest provided annual beach nourishment at the downdrift end of Forest Park Beach in 1991, 1992, and 1993. The three years of nourishment totaled just under 10,000 cu yd [7,600 cu m; (9,939 cu yd; 7,599 cu m)]. The objective in providing this nourishment was to compensate downdrift areas for accretion of an updrift bar that was detected soon after completion of the facility. Subtracting this nourishment volume from the net accretion gives a 1987-1995 adjusted net accretion of 35,800 cu yd (27,400 cu m). This does not include 1987-1992 net change of less than 1 ft.

3. The boat-launch basin at Forest Park Beach is a trap for littoral sediment. Annual dredging of the basin returns this sediment to the downdrift nearshore, so the littoral system has no net loss due to the basin entrapment. Annual dredging since 1989 (table 9) totals 22,440 cu yd (17,200 cu m), an average annual dredge volume of 3,206 cu yd/yr (2,451 cu m/yr).

4. Natural bypass of Forest Park Beach has occurred since at least 1988, as indicated by a 1987-1988 lake-bottom change map showing an accretion wedge extending southward along the lakeward perimeter of the facility as far south as the boat-launch basin (fig. 21). Modifications occurred to this accretion wedge as it experienced either net accretion or net erosion. The long-term map of lake-bottom change (1987-1995; fig.24) shows that this accretion wedge is a net lake-bottom change extending as far south as that occurring in the 1987-1988 comparison (fig. 21). Farther south, wave energy is apparently sufficient to rapidly move sediment downdrift and prevent the southward continuation of this sand bridge.

5. Although net erosion has occurred across the nearshore lake bottom south of Forest Park Beach, there is no documented deterioration, failure, or instability of any shore-defense structures in this downdrift part of the monitoring area. The 1987-1995 net erosion in this area has maximum values exceeding 3 ft (0.9 m). Equally severe erosion has occurred adjacent to the riprap on the southern margin of the Forest Park Beach facility. Observations have not detected any instability of this riprap.

6. On a year-to-year basis, the monitoring area has been extremely dynamic, with either net erosion or net accretion occurring in some of the same areas. This indicates considerable sensitivity to changes in such parameters as littoral sediment supply, frequency and intensity of storms, and fluctuations in lake level. For example, in 1993-1994 there was more net accretion than was documented in any other year, but subsequently in 1994-1995 there was more net erosion than was documented in any other year. Thus the accretion and erosion in the monitoring area has been episodic and variable rather than having a persistent and uniform trend.

7. The fluctuations in erosion and accretion indicate that the net accretion that has occurred in the monitoring area should not be considered a permanent entrapment. A key factor is apparently fluctuation in the supply of sediment from updrift. If this supply is diminished or eliminated, much of the present accretion on the lakeward perimeter of the facility, and possibly in the beach cells, will likely be removed by erosion.

8. In pre-construction planning and design, entrapment of large volumes of littoral sediment was not anticipated to occur at Forest Park Beach. The littoral sediment supply reaching Forest Park Beach was considered minimal due to updrift barriers formed by Great Lakes Harbor and Waukegan Harbor. Analysis of updrift lake-bottom changes by the ISGS for the U.S. Army Corps of Engineers Interim IV study indicates that natural bypass of Great Lakes Harbor was occurring at least by 1974, and as of 1976 the Great Lakes Harbor basin was no longer a significant sediment trap. Artificial bypass of dredged sediment from Waukegan Harbor feeds the littoral stream that can bypass Great Lakes Harbor and reach Forest Park Beach. This artificial bypass at Waukegan is considered a primary sediment source for the sediment that has accumulated at Forest Park Beach. Other sources are limited natural bypass of Waukegan Harbor and nearshore erosion between Waukegan Harbor and Forest Park Beach.

9. The coastal monitoring data collected at Forest Park Beach has made this the most intensely studied coastal engineering project on the Illinois coast. Two different monitoring programs have generated a database spanning eight years of post-construction monitoring. The data quality varies from good to exceptional. The monitoring data from 1987 and 1988 (Lake Forest Shoreline Monitoring Committee, 1990a, b) has some limitations due to profile spacing and data collection. The monitoring data collected by a consultant for the City of Lake Forest in 1991 has limited areal coverage (CH2M HILL, 1992). However, the data collected annually by the City of Lake Forest from 1992 through 1995 has produced a data set of exceptional quality and unprecedented detail for coastal monitoring on the Illinois coast.

ACKNOWLEDGMENTS
This ISGS monitoring project at Forest Park Beach could not have been successfully completed without the cooperation and assistance of the City of Lake Forest Engineering Department, Police Department, and Department of Parks, Forestry and Public Works. The staff in charge of Forest Park Beach were particularly helpful in providing assistance for short-term storage of the ISGS boat and other equipment, and other logistics related to the ISGS field work.

ISGS personnel assisting in the field studies at Forest Park Beach were Douglas Mulvey and Anthony Foyle. Christopher Nowakowski assisted with the data processing and performed all computer plotting of maps, profiles, and profile comparisons. Douglas Mulvey also assisted in preparation of report graphics.

This study was primarily funded by the Illinois Department of Natural Resources Office of Water Resources under Project No. WR-09118/SRA-190. Additional funding was provided by the Illinois State Geological Survey.

This Open-File report was written for the Illinois Department of Natural Resources Office of Water Resources. It has been through technical and administrative review.

REFERENCES

Anglin, C.D., MacIntosh, A.M., Baird, W.F., and Werren, D.J., 1987, Artificial beach design, Lake Forest, Illinois: *in* Magoon, O.T., and four others (eds.), Coastal Zone '87, Proceedings of the Fifth Symposium on Coastal and Ocean Management, Seattle, Washington, May 26-29, 1987, American Society of Civil Engineers, New York, v. 1, p. 1121-1129.

Baird, W.F.; & Associates, 1993a, Data conversion and volumetric analysis, 1988 to 1992, Forest Park Beach: prepared for The City of Lake Forest, August 23, 1993: W.F. Baird & Associates, Ltd., Madison, Wisconsin, 18 p.

Baird, W.F., & Associates, 1993b, Data conversion and volumetric analysis, 1992 to 1993, Forest Park Beach: prepared for The City of Lake Forest, December 7, 1993: W.F. Baird & Associates, Ltd., Madison, Wisconsin, 4 p., 13 drawings.

Baird, W.F., & Associates, 1994, 1994 beach and nearshore monitoring program, volumetric analysis, Forest Park Beach: prepared for the City of Lake Forest, December 1994: W.F. Baird & Associated, Ltd., Madison, Wisconsin, 3 p., 13 drawings.

Baird, W.F., & Associates, 1996, 1995 beach and nearshore monitoring program, volumetric analysis, Forest Park Beach: prepared for the City of Lake Forest, December 1994: W.F. Baird & Associated, Ltd., Madison, Wisconsin, 4 p., 13 drawings.

CH2M HILL, 1992, Shoreline monitoring of Forest Park Beach, Lake Forest, Illinois, Volume 1: CH2M HILL, Bellevue, Washington, 11 p. plus 2 tables, 8 figures, 4 appendices.

Chrzastowski, M.J., and Trask, C.B., 1992, Review of the final report for the 1991 beach and nearshore monitoring program at Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation Division of Water Resources (Project WR-09118/SRA-190), Illinois State Geological Survey Open File Series 1992-12, Champaign, Illinois, 64 p. plus four appendices.

Chrzastowski, M.J., and Trask, C.B., 1994, Review of the final report for the 1993 beach and nearshore monitoring program at Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation Division of Water Resources (Project WR-09118/SRA-190), Illinois State Geological Survey Open File Series 1994-3, Champaign, Illinois, 56 p. plus six appendices, 1 map (scale 1:2400).

Chrzastowski, M. J. And Trask, C. B., 1995, Nearshore geology and geologic processes along the Illinois shore of Lake Michigan from Waukegan harbor to Wilmette Harbor: contract report submitted to U. S. Army Corps of Engineers (Contract DACW23-95-M-0143), Illinois State Geological Survey Open File Series 1995-10, Champaign, Illinois, 93 p.

Environmental Systems Research Institute, Inc., 1991, Surface modeling with TIN, ARC/INFO Users Guide Rev. 6.0: Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, 213 p. plus four appendices.

Krumbein, W.C. and Ohsiek, L.E., 1950, Pulsational transport of sand by shore agents: Transactions, American Geophysical Union, v. 31, no. 2, pp. 216-220.

Lake Forest Shoreline Monitoring Committee, 1990a, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Executive Summary and Report (Part 1 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 74 p.

Lake Forest Shoreline Monitoring Committee, 1990b, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Appendices (Part 2 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 123 p.

Magnus, K.M., 1993a, The City of Lake Forest 1992 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus three appendices.

Magnus, K.M., 1993b, The City of Lake Forest 1993 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus four appendices.

Magnus, K.M., Hammer, A., Mock, C., and Miller, P., 1994, The City of Lake Forest 1994 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 12 p. plus three appendices.

Magnus, K.M., Hammer, A., and Miler, P., 1996, The City of Lake Forest 1995 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 113 p. plus three appendices.

Norby, R.D., 1981, Evaluation of Lake Michigan nearshore sediments for nourishment of Illinois beaches: Illinois State Geological Survey, Environmental Geology Notes 97, Champaign, Illinois, 61 p.

Trask, C.B. and Chrzastowski, M.J., 1993, Review of the final report for the 1992 beach and nearshore monitoring program, Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation (IDOT) Division of Water Resources (IDOT Project No. WR-09118/SRA-190) Illinois State Geological Survey, Open File Series 1993-11, Champaign, Illinois, 78 p. plus 7 appendices, 1 map (scale 1:2400).

Trask, C.B. and Chrzastowski, M.J., 1995, Review of the final report for the 1994 beach and nearshore monitoring program, Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation (IDOT) Division of Water Resources (IDOT Project No. WR-09118/SRA-190) Illinois State Geological Survey, Open File Series 1995-7, Champaign, Illinois, 43 p. plus 5 appendices, 1 map (scale 1:2400).

DISTRIBUTION LIST

Bound copies of this report have been sent to the offices and libraries listed below. Copies of this report are available at the cost of reproduction from the ISGS.

Offices

Illinois Department of Natural Resources
Office of Water Resources
Chicago, Illinois

The City of Lake Forest
Lake Forest, Illinois

U.S. Army Corps of Engineers
Chicago District
Chicago, Illinois

Libraries (Local and State)

City of Lake Forest Library
Lake Forest, Illinois

Illinois State Geological Survey Library
Champaign, Illinois

Illinois State Water Survey Library
Champaign, Illinois

Illinois State Library
Springfield, Illinois

Illinois Department of Natural
Resources Library
Springfield, Illinois

Libraries (Federal)

U.S. Geological Survey Library
Reston, Virginia

U.S. Army Corps of Engineers
Chicago District Library
Chicago, Illinois

U. S. Army Corps of Engineers
North Central Division Library
Chicago, Illinois

U.S. Army Corps of Engineers
Waterways Experiment Station
CERC Library
Vicksburg, Mississippi

Information Services

American Geological Institute (Georef)
Alexandria, VA

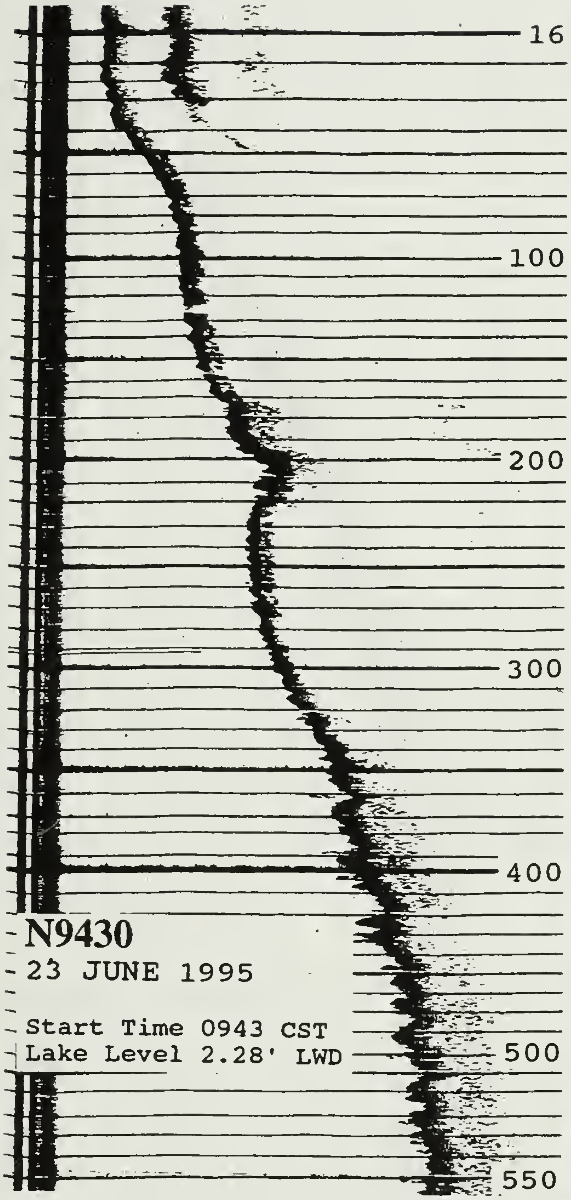
NTIS
Springfield, VA

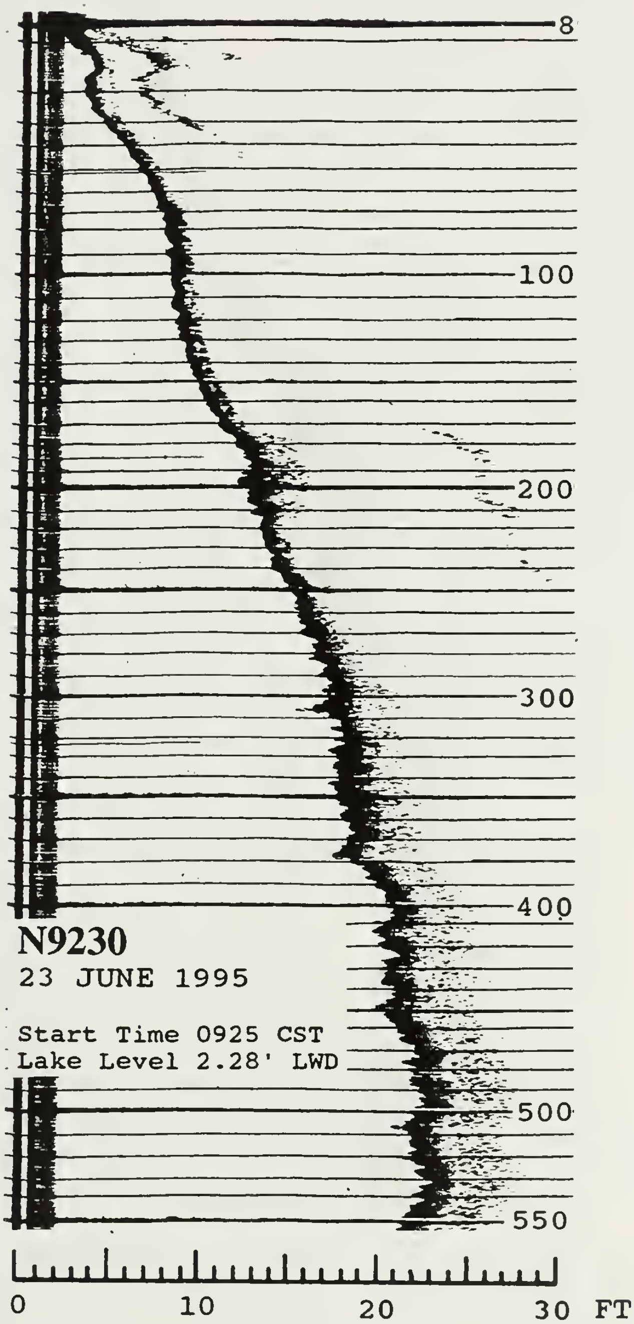
APPENDIX A ISGS FATHOMETER TRACES FOR JUNE 1995

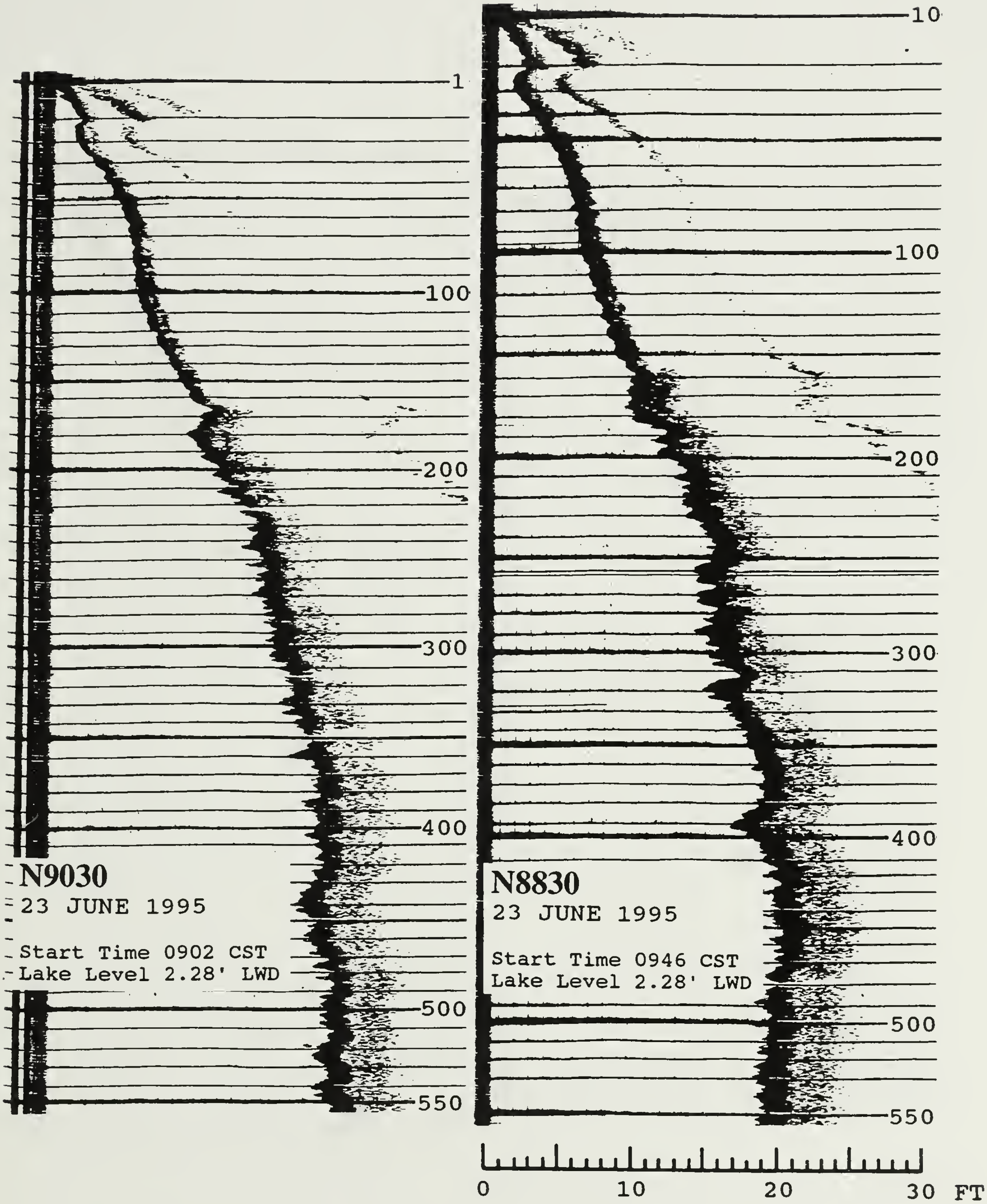
The following are photo-reduced copies of the ISGS fathometer strip-charts that extend a distance of 1,804 ft (550 m) offshore from the profile control point (lines N8630 and N8030 go to 500 m).

Vertical lines across each fathometer trace are event marks corresponding to 32.8-ft (10-m) increments as displayed on the console for the Motorola Mini-Ranger III.

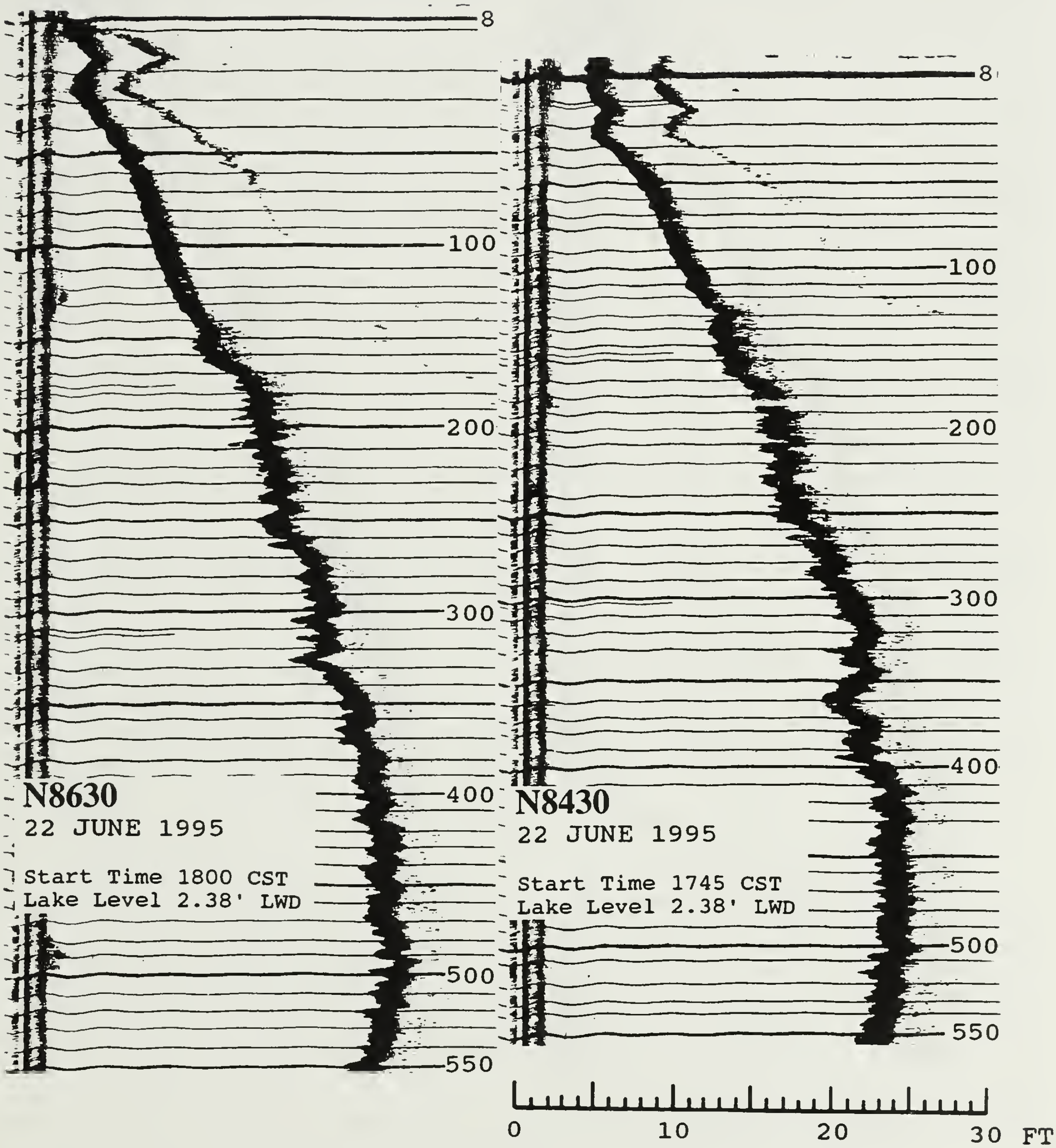
Depth is recorded in feet referenced to the lake level at the time of the survey. No transducer draft correction is needed because the fathometer trace already incorporates this correction.


16
100
200
300
400
500
550
N9430
23 JUNE 1995
Start Time 0943 CST
Lake Level 2.28' LWD

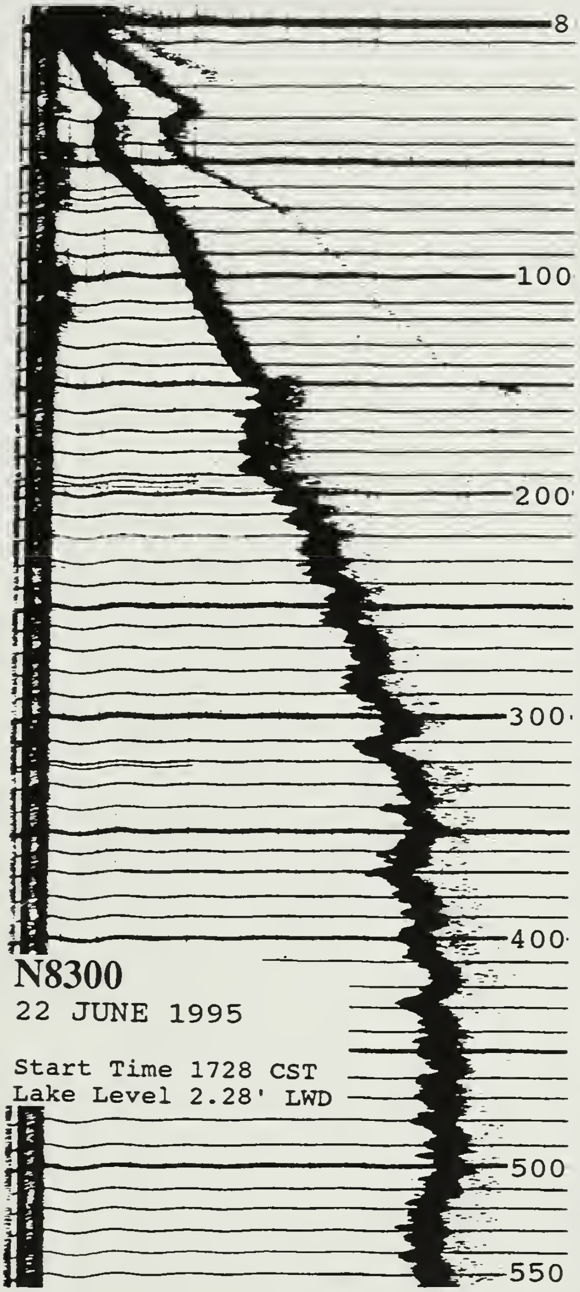

8
100
200
300
400
500
550
N9230
23 JUNE 1995
Start Time 0925 CST
Lake Level 2.28' LWD
0
10
20
30 FT

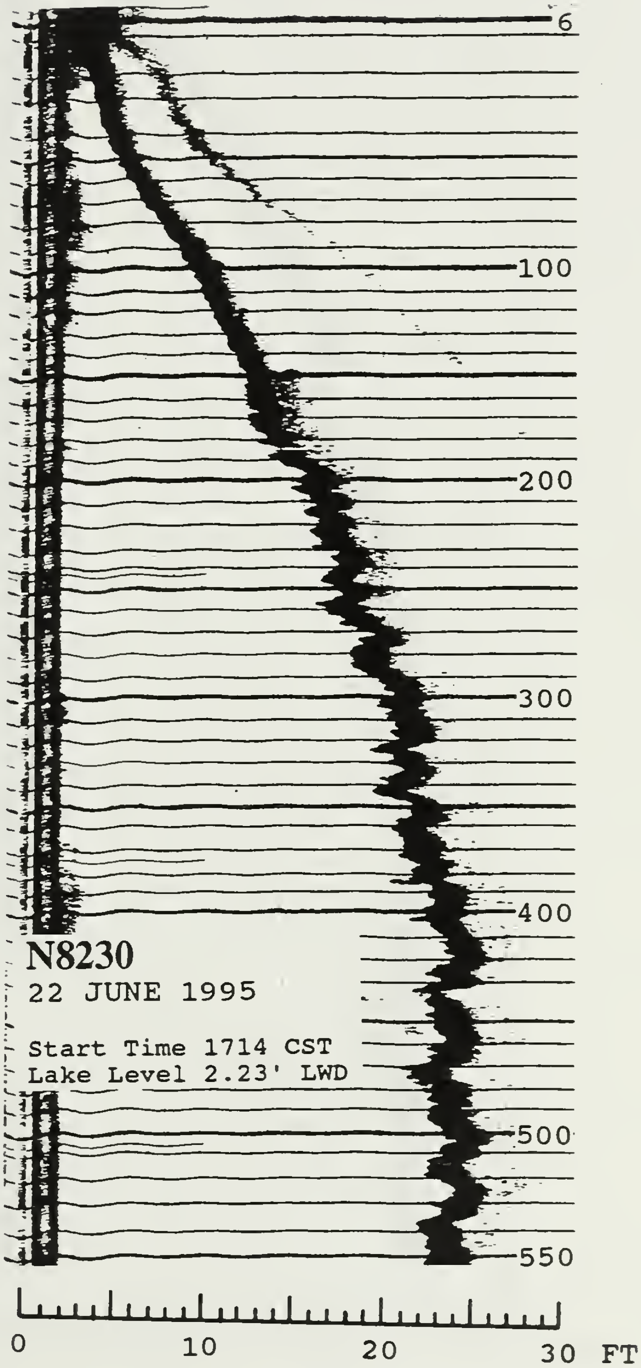


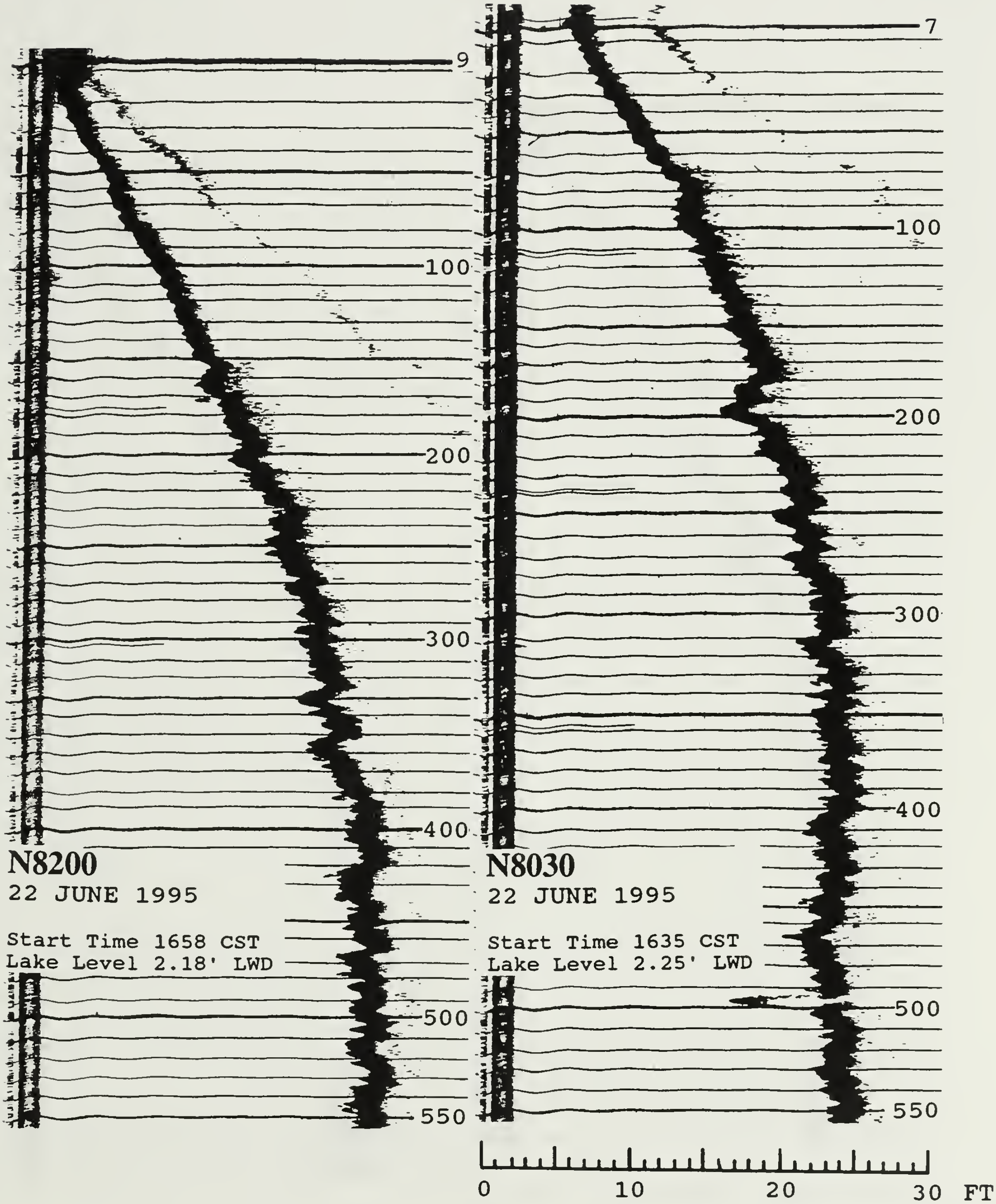
1
100
200
300
400
500
550
N9030
23 JUNE 1995
Start Time 0902 CST
Lake Level 2.28' LWD
10
100
200
300
400
500
550
N8830
23 JUNE 1995
Start Time 0946 CST
Lake Level 2.28' LWD
0
10
20
30 FT



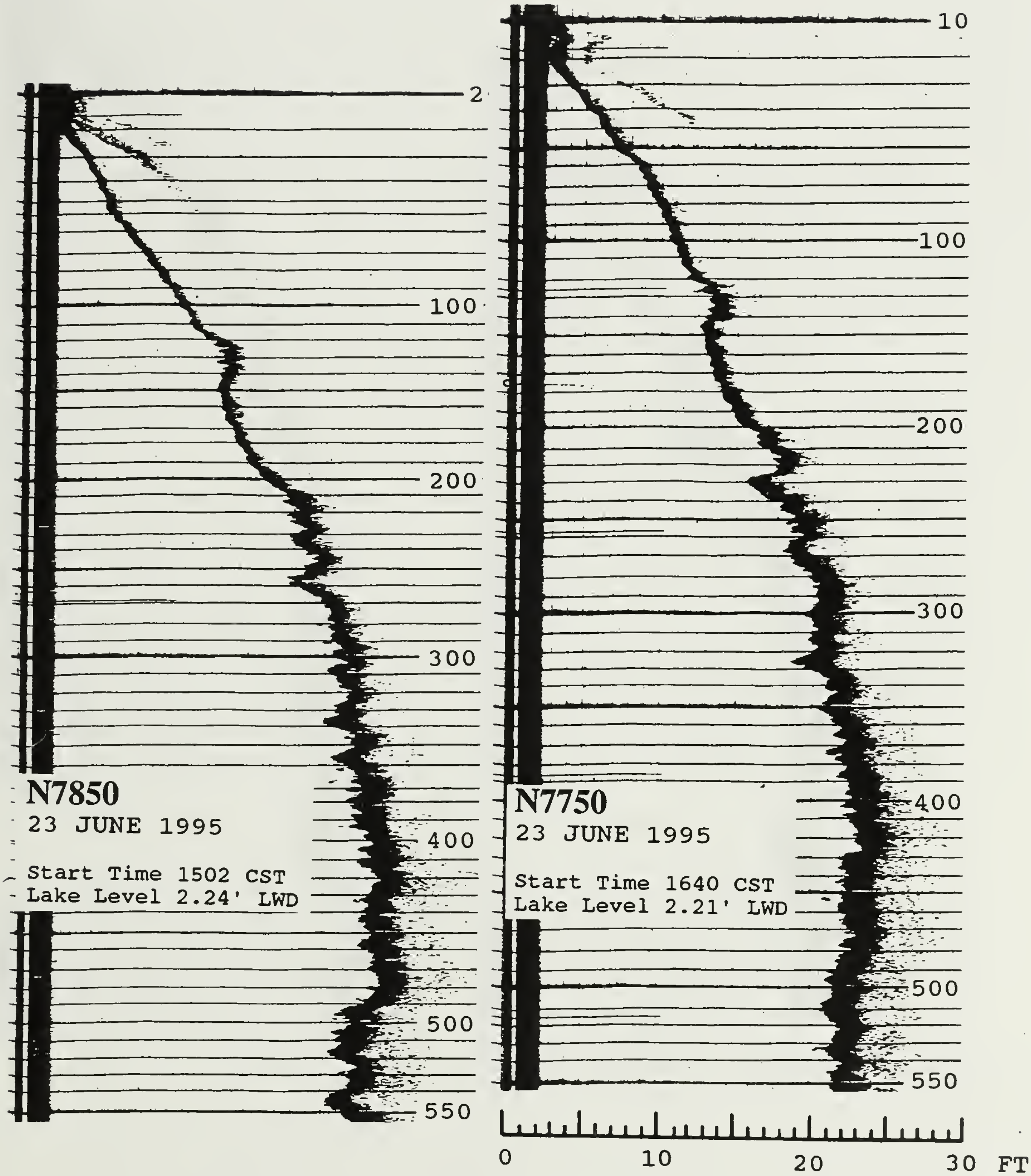
8
100
200
300
400
500
550
N8630
22 JUNE 1995
Start Time 1800 CST
Lake Level 2.38' LWD
8
100
200
300
400
500
550
N8430
22 JUNE 1995
Start Time 1745 CST
Lake Level 2.38' LWD
0
10
20
30 FT


8
100
200
300
400
500
550
N8300
22 JUNE 1995
Start Time 1728 CST
Lake Level 2.28' LWD

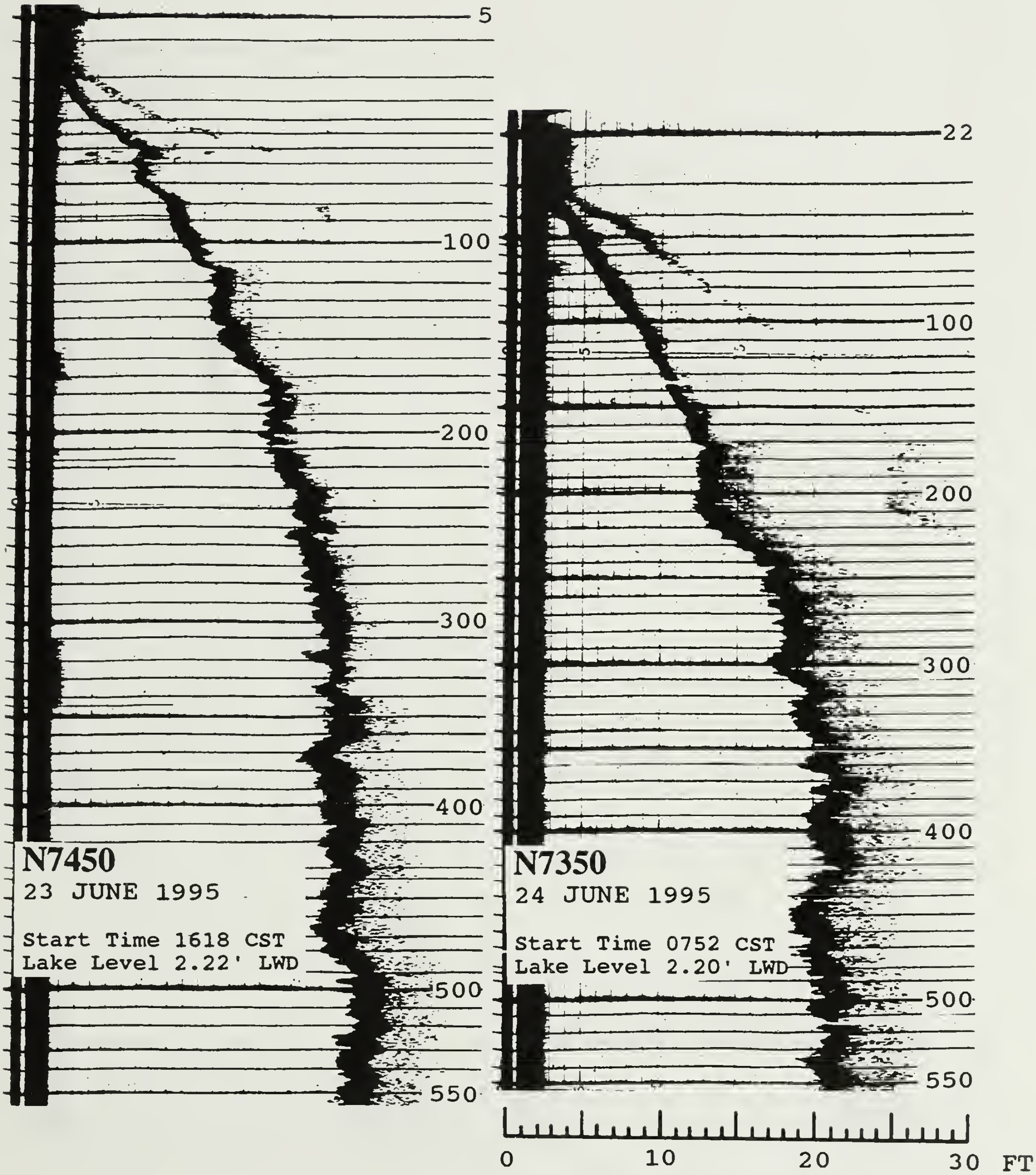

6
100
200
300
400
500
550
N8230
22 JUNE 1995
Start Time 1714 CST
Lake Level 2.23' LWD
0
10
20
30 FT

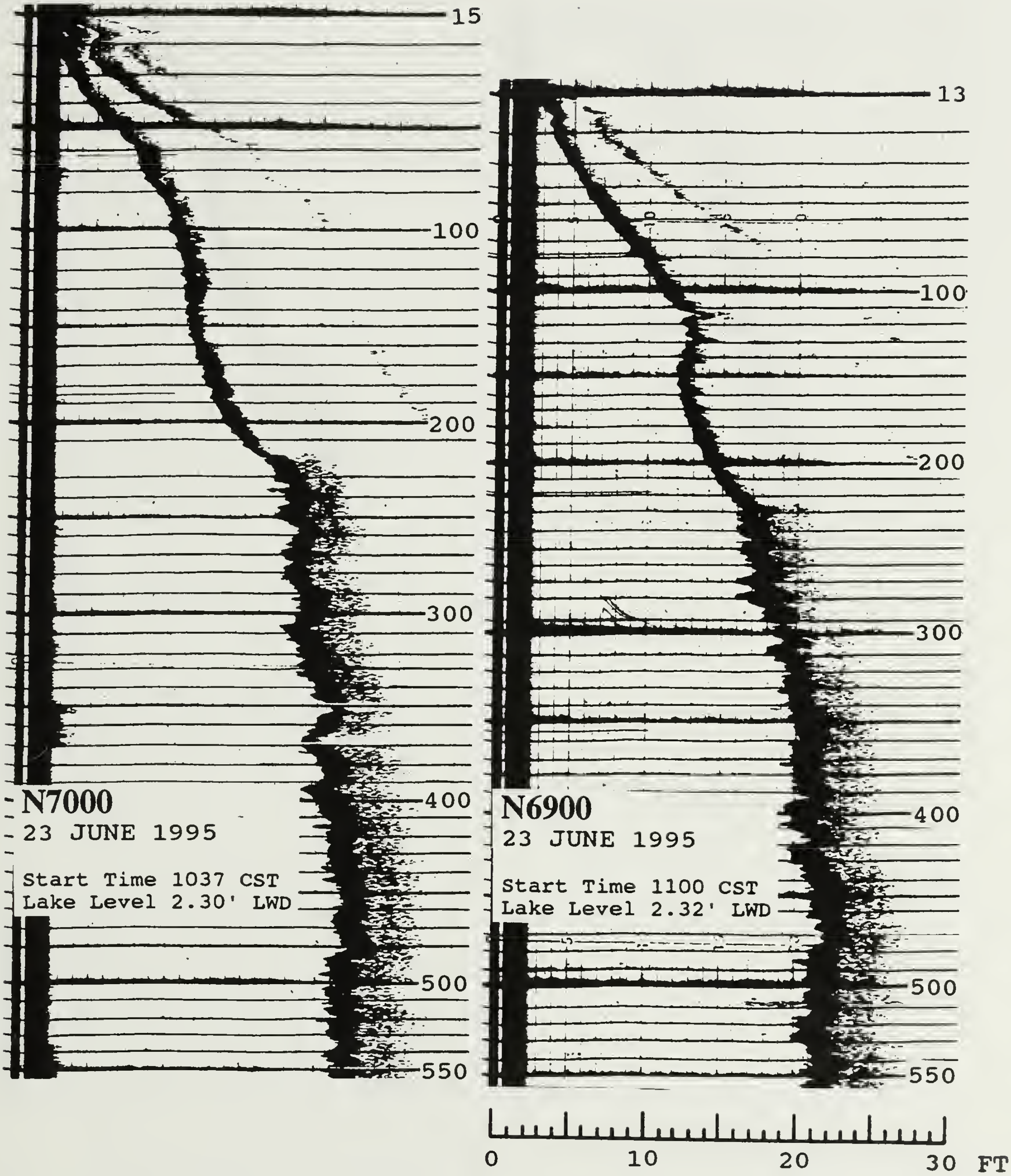


N8200
22 JUNE 1995
Start Time 1658 CST
Lake Level 2.18' LWD
9
100
200
300
400
500
550
N8030
22 JUNE 1995
Start Time 1635 CST
Lake Level 2.25' LWD
7
100
200
300
400
500
550
0
10
20
30 FT

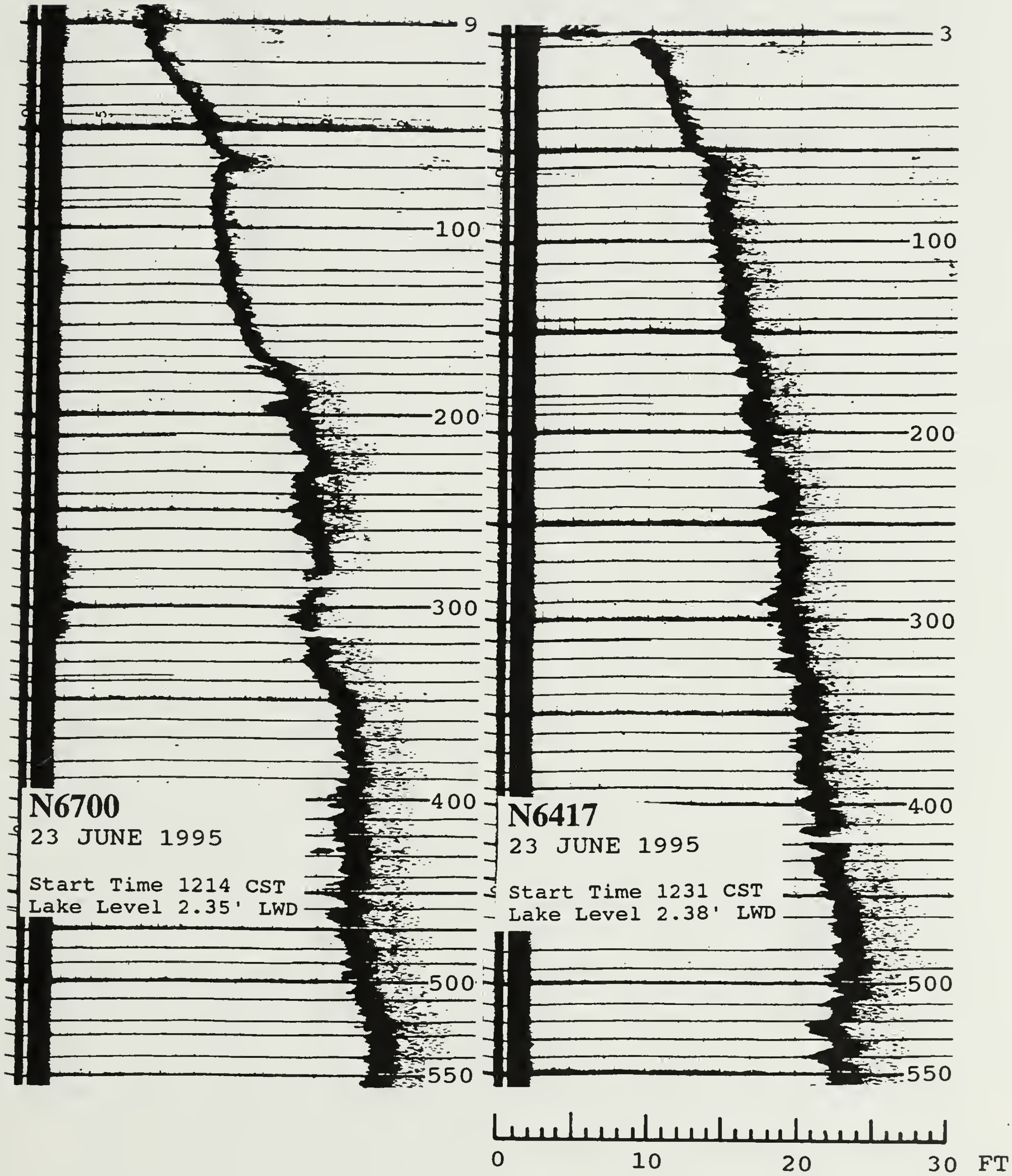


2
100
200
300
400
500
550
N7850
23 JUNE 1995
Start Time 1502 CST
Lake Level 2.24' LWD
10
100
200
300
400
500
550
N7750
23 JUNE 1995
Start Time 1640 CST
Lake Level 2.21' LWD
0
10
20
30 FT

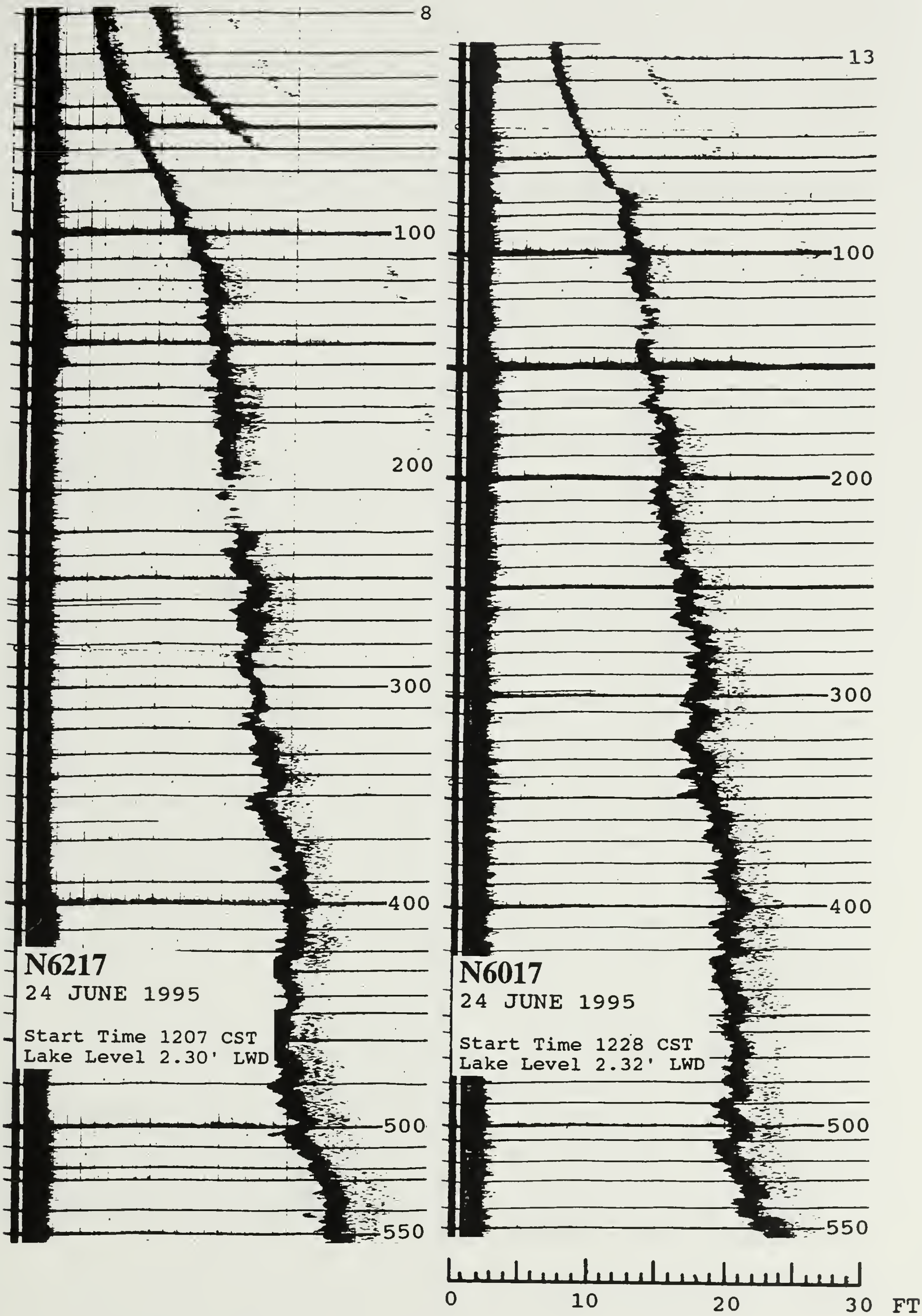

5
100
200
300
400
500
550
N7450
23 JUNE 1995
Start Time 1618 CST
Lake Level 2.22' LWD
22
100
200
300
400
500
550
N7350
24 JUNE 1995
Start Time 0752 CST
Lake Level 2.20' LWD
0
10
20
30 FT

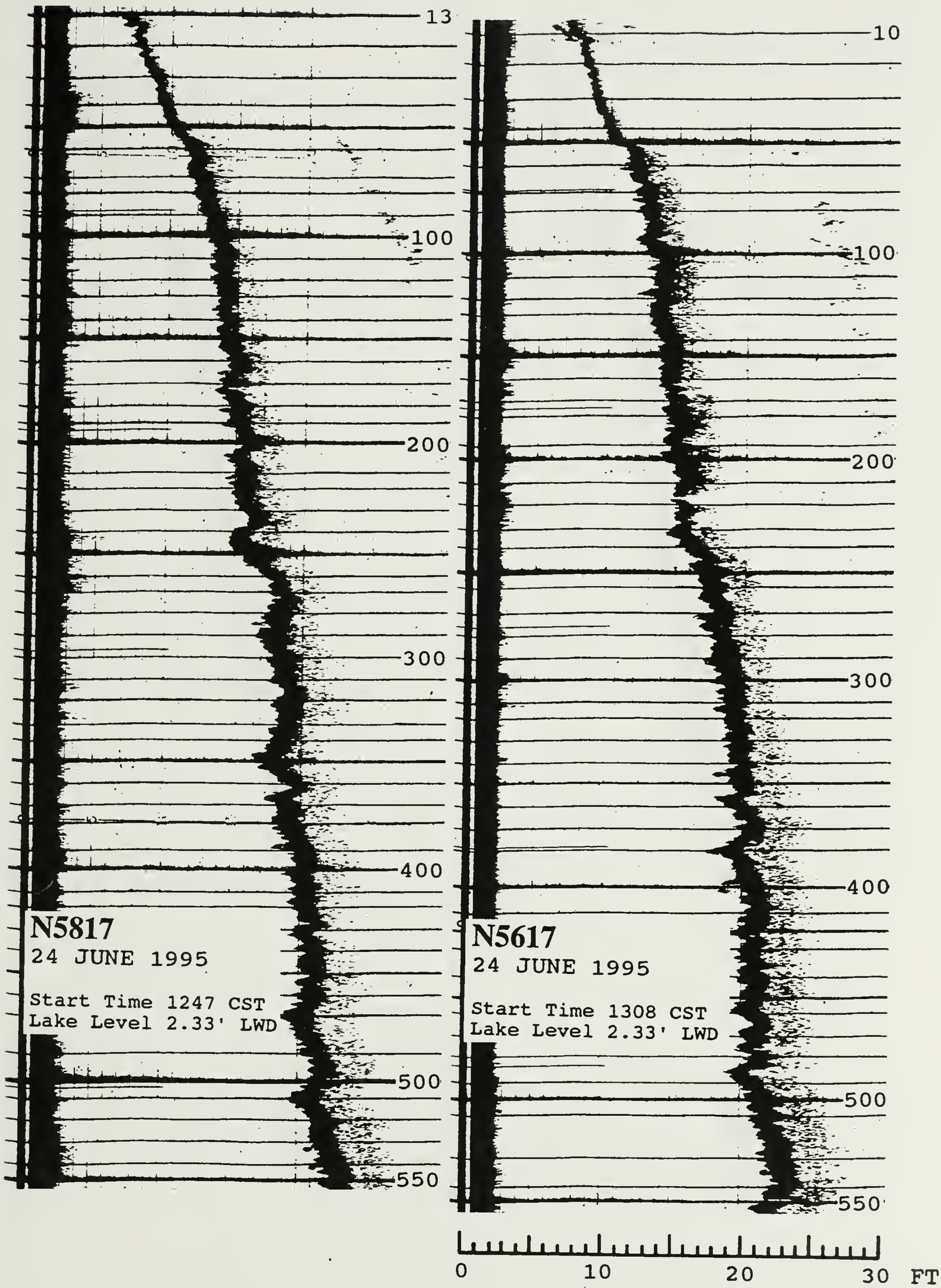


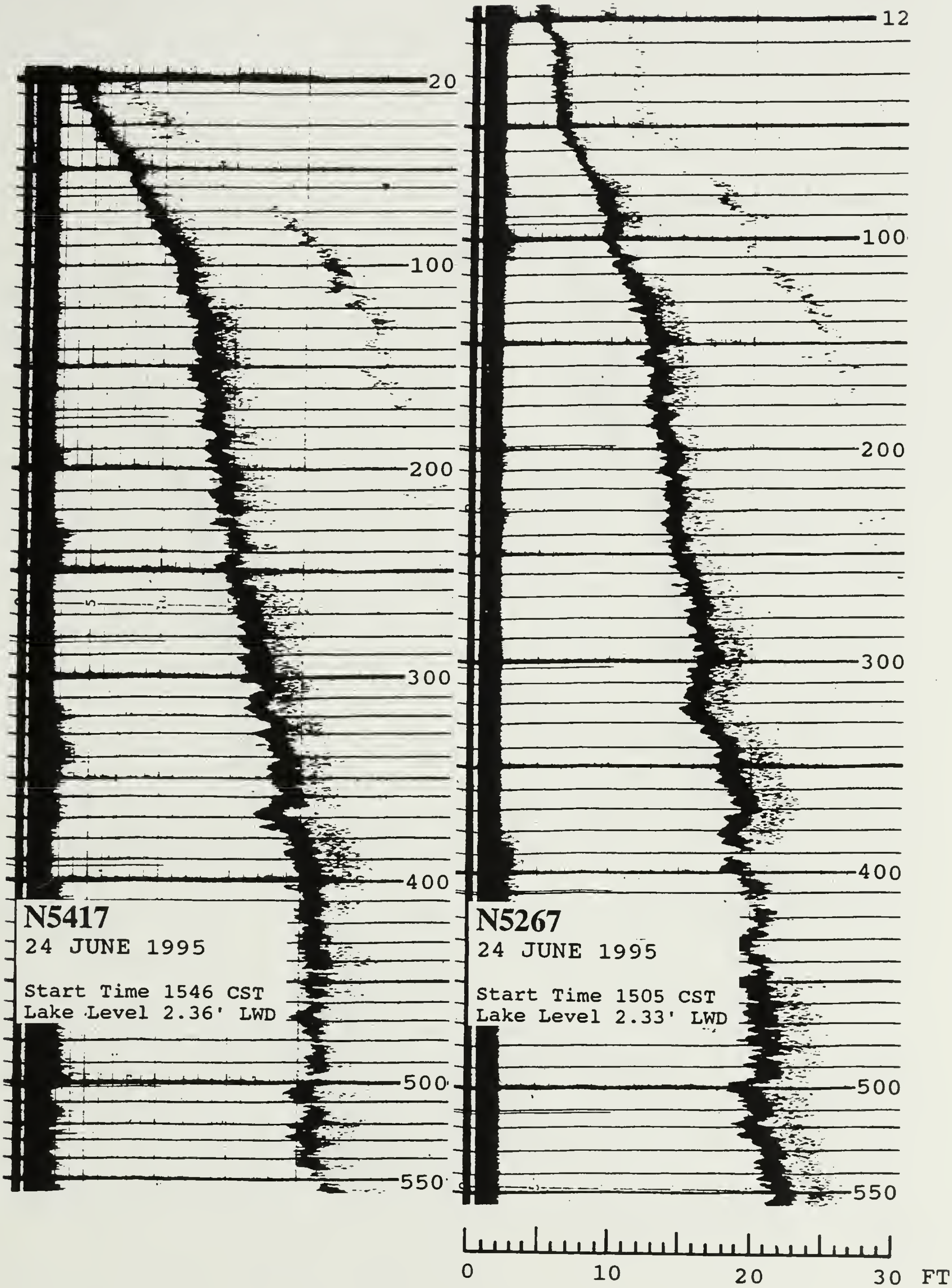
15
100
200
300
400
500
550
N7000
23 JUNE 1995
Start Time 1037 CST
Lake Level 2.30' LWD
13
100
200
300
400
500
550
N6900
23 JUNE 1995
Start Time 1100 CST
Lake Level 2.32' LWD
0
10
20
30 FT

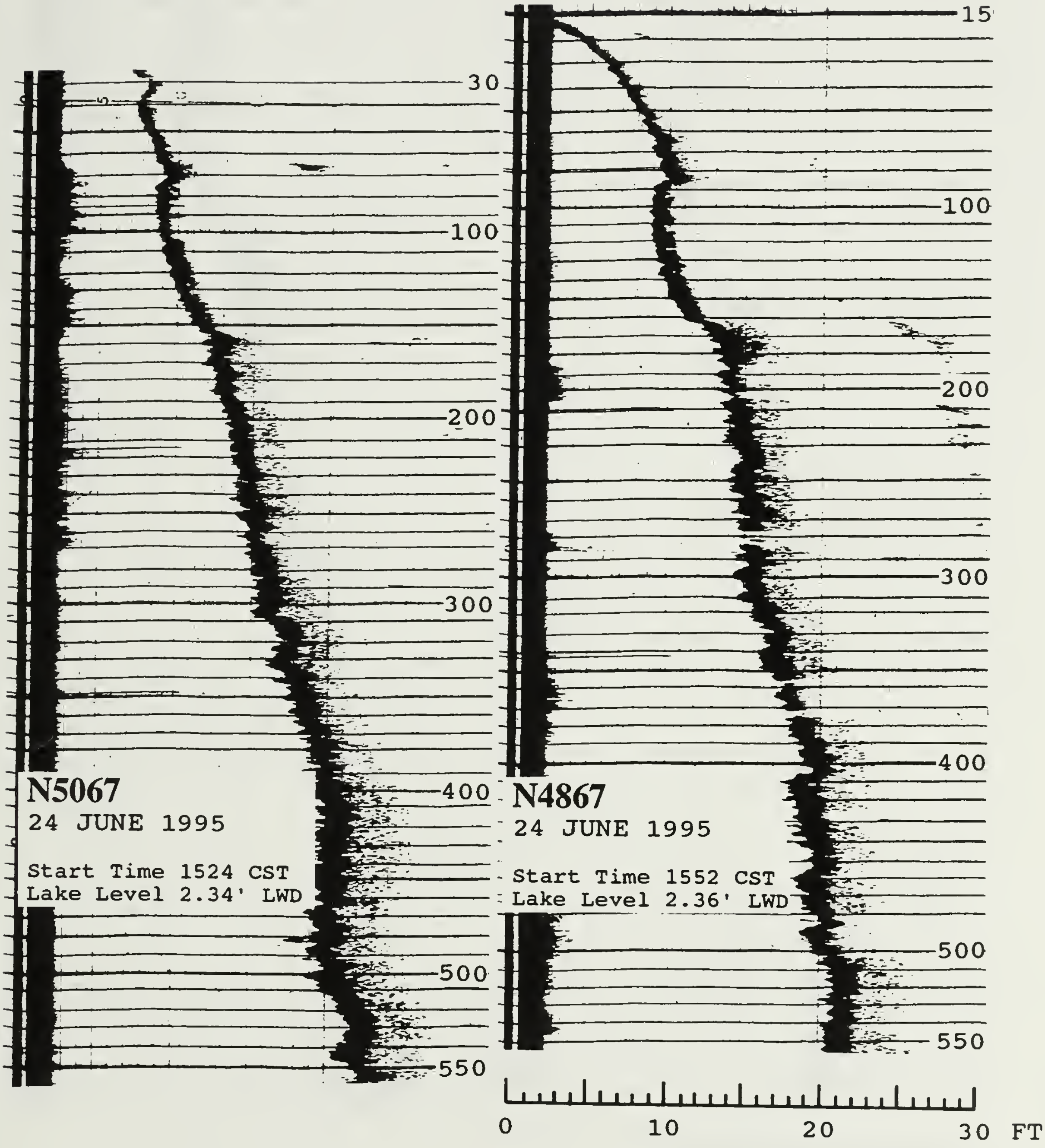


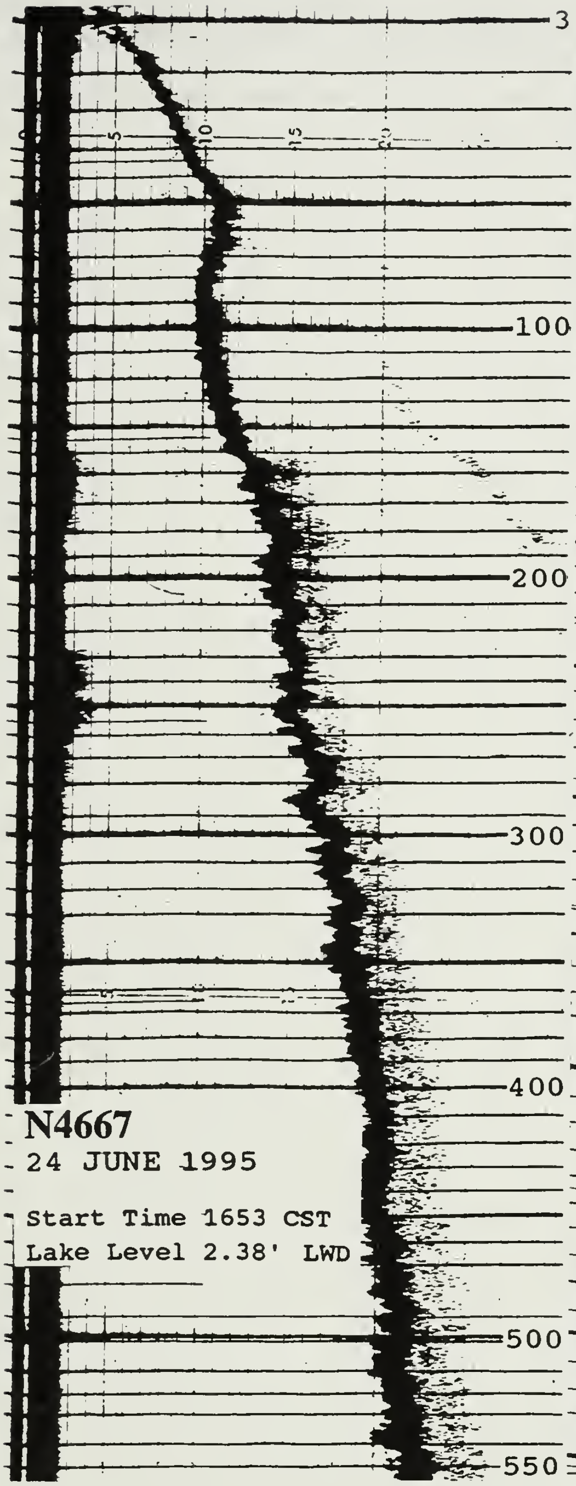
9
100
200
300
400
550
N6700
23 JUNE 1995
Start Time 1214 CST
Lake Level 2.35' LWD
3
100
200
300
400
500
550
N6417
23 JUNE 1995
Start Time 1231 CST
Lake Level 2.38' LWD
0
10
20
30 FT

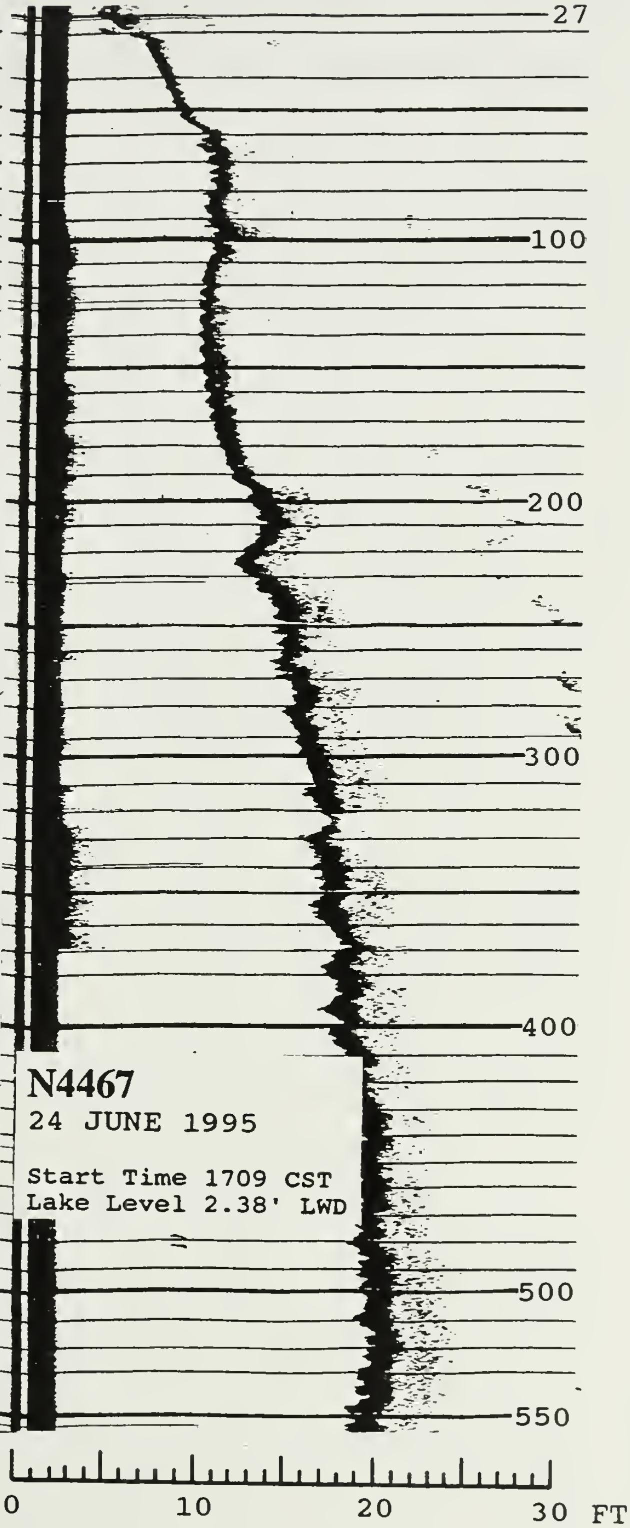

8
100
200
300
400
500
550
N6217
24 JUNE 1995
Start Time 1207 CST
Lake Level 2.30' LWD
13
100
200
300
400
500
550
N6017
24 JUNE 1995
Start Time 1228 CST
Lake Level 2.32' LWD
0
10
20
30 FT


N5817
24 JUNE 1995
Start Time 1247 CST
Lake Level 2.33' LWD
13
100
200
300
400
500
550
N5617
24 JUNE 1995
Start Time 1308 CST
Lake Level 2.33' LWD
10
100
200
300
400
500
550
0
10
20
30 FT


20
100
200
300
400
500
550
N5417
24 JUNE 1995
Start Time 1546 CST
Lake Level 2.36' LWD
12
100
200
300
400
500
550
N5267
24 JUNE 1995
Start Time 1505 CST
Lake Level 2.33' LWD
0
10
20
30 FT


30
100
200
300
400
500
550
N5067
24 JUNE 1995
Start Time 1524 CST
Lake Level 2.34' LWD
15
100
200
300
400
500
550
N4867
24 JUNE 1995
Start Time 1552 CST
Lake Level 2.36' LWD
0
10
20
30 FT


3
5
10
15
20
100
200
300
400
500
550
N4667
24 JUNE 1995
Start Time 1653 CST
Lake Level 2.38' LWD

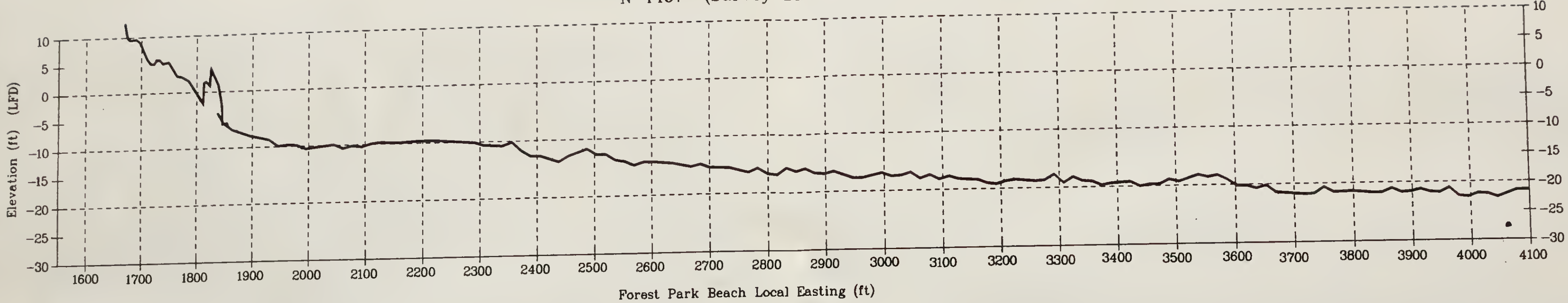

27
100
200
300
400
500
550
N4467
24 JUNE 1995
Start Time 1709 CST
Lake Level 2.38' LWD
0
10
20
30 FT

APPENDIX B ISGS JUNE 1995 LONG PROFILES

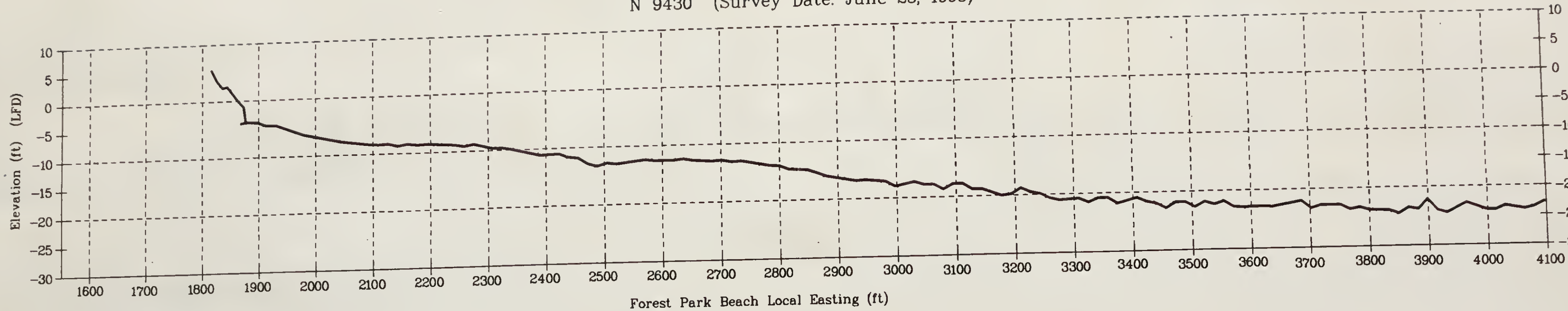
Dates on profiles are for the fathometer profiling. The prism-pole profiling across the beach and shallow nearshore was done within 1 week, most within 1 day, of the fathometer profiling.

Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.

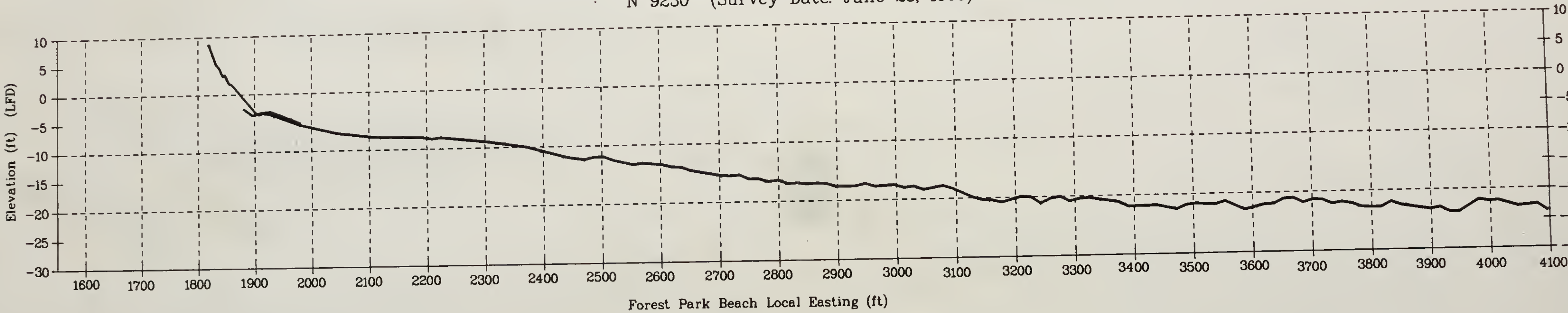
N 4467 (Survey Date: June 24, 1995)



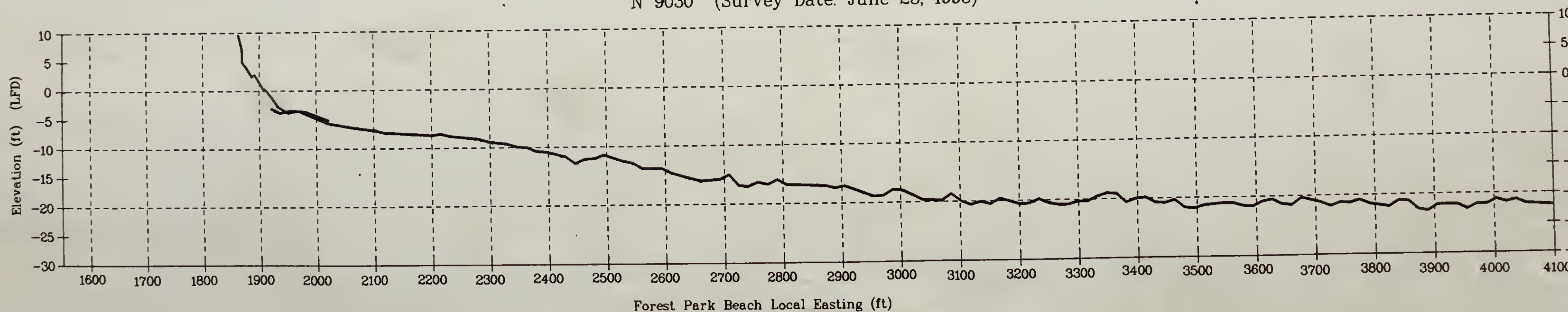
N 9430 (Survey Date: June 23, 1995)



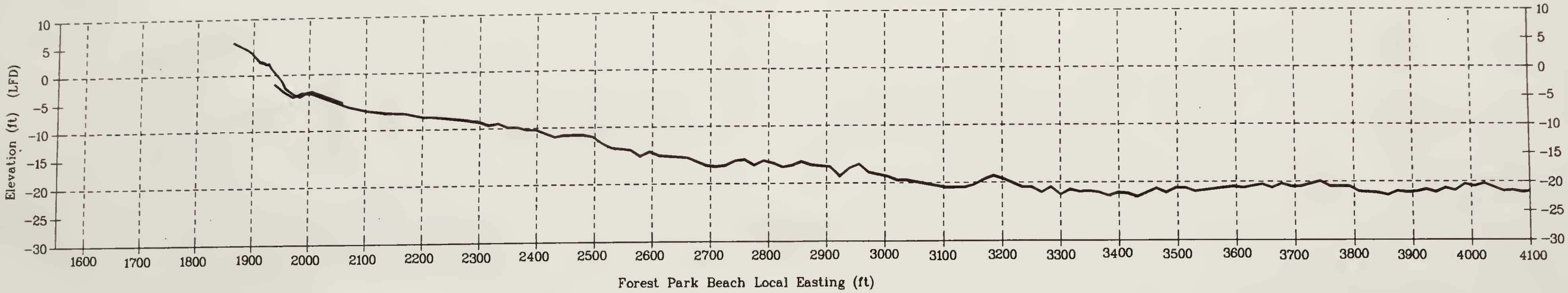
N 9230 (Survey Date: June 23, 1995)



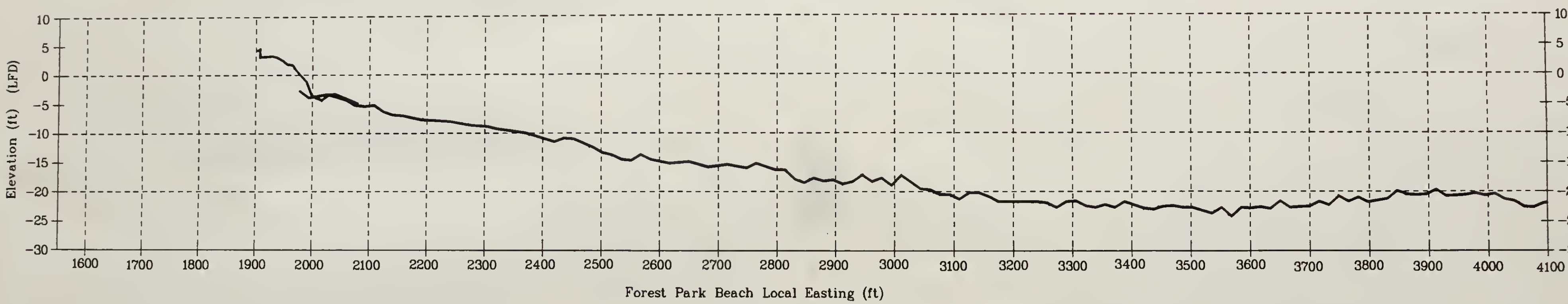
N 9030 (Survey Date: June 23, 1995)



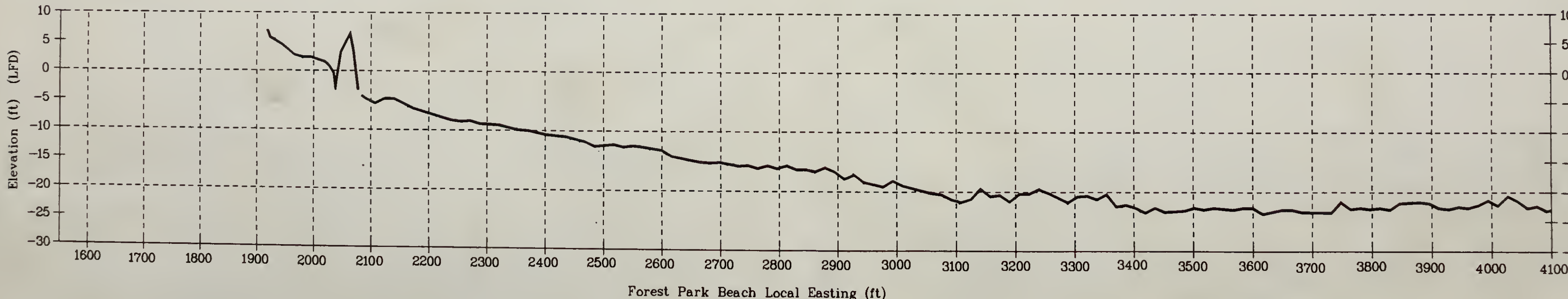
N 8830 (Survey Date: June 23, 1995)



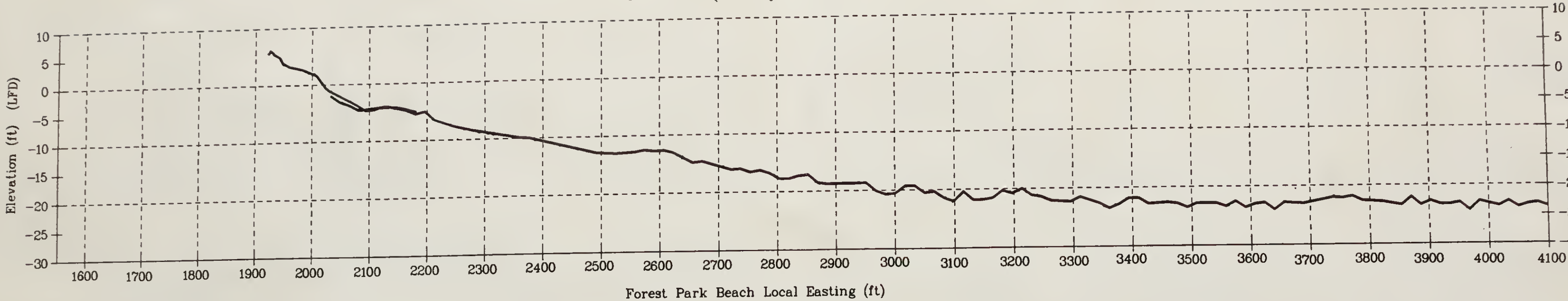
N 8630 (Survey Date: June 22, 1995)



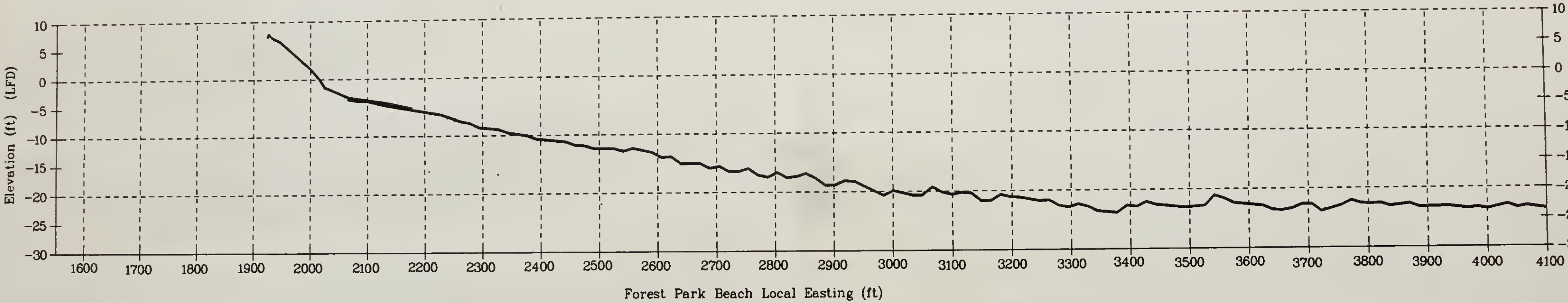
N 8430 (Survey Date: June 22, 1995)



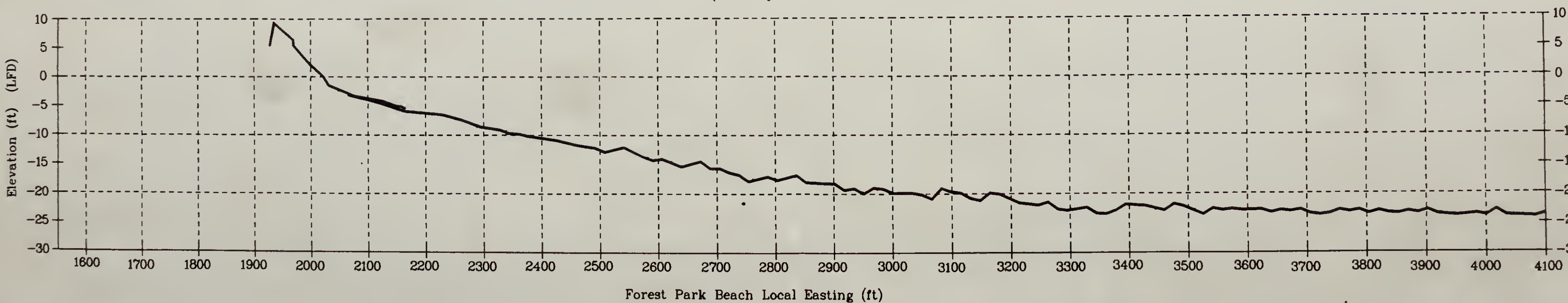
N 8300 (Survey Date: June 22, 1995)



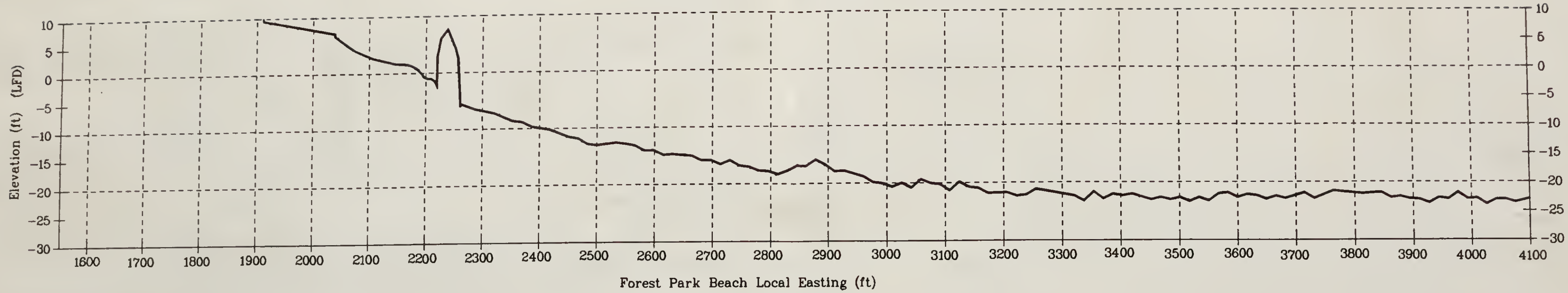
N 8230 (Survey Date: June 22, 1995)



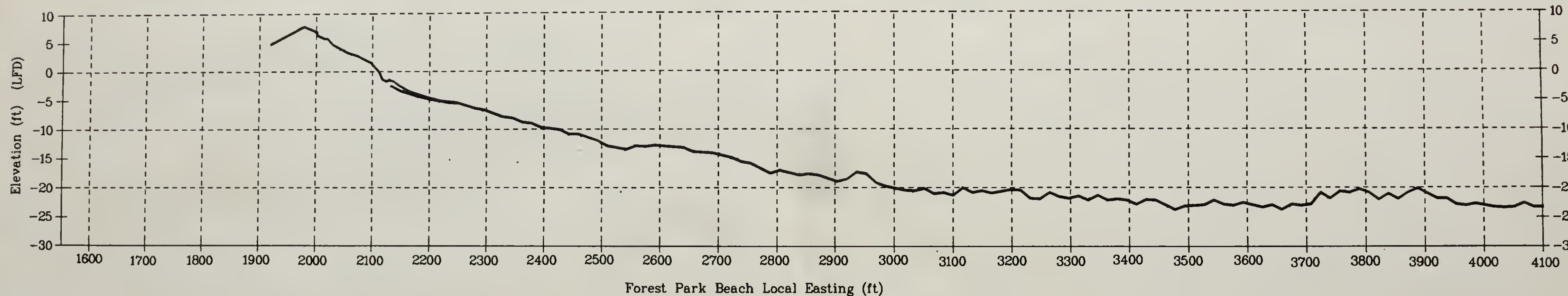
N 8200 (Survey Date: June 22, 1995)



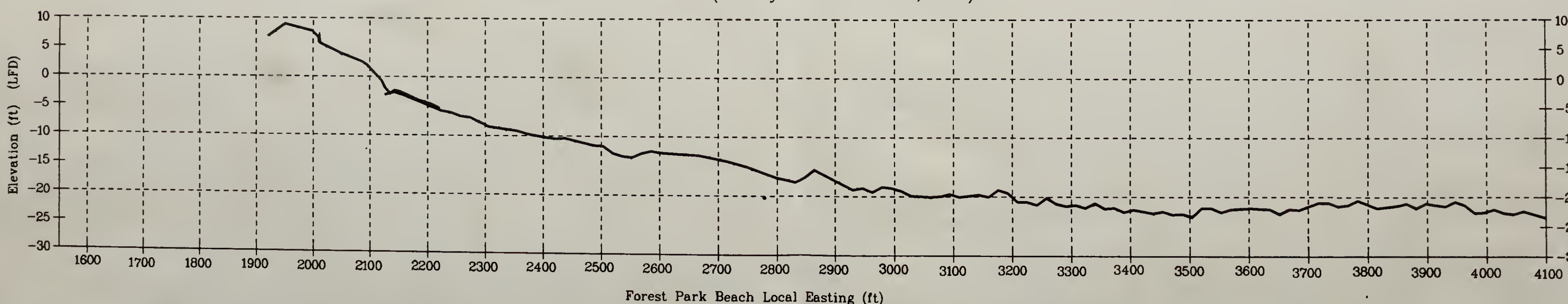
N 8030 (Survey Date: June 22, 1995)



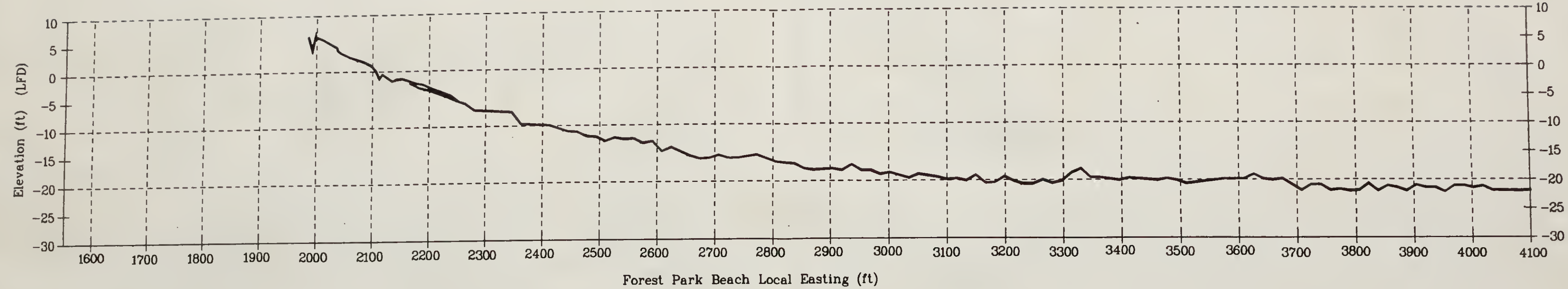
N 7850 (Survey Date: June 23, 1995)



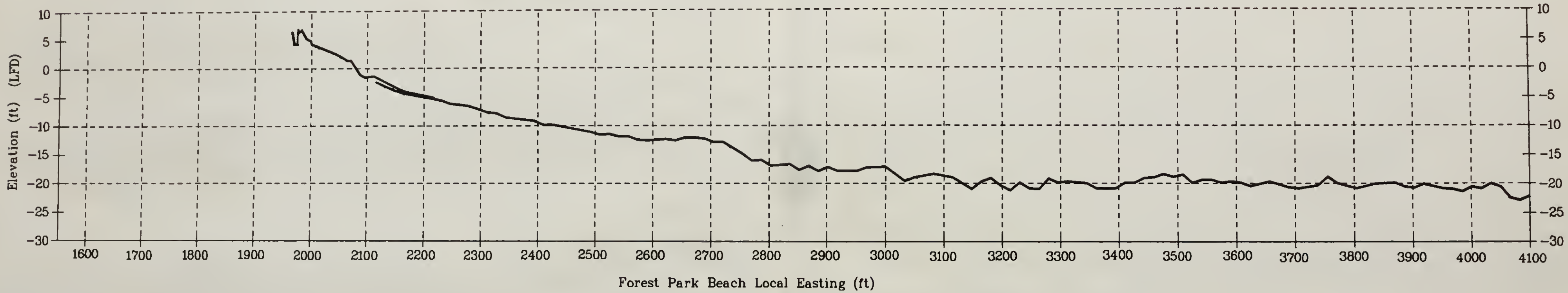
N 7750 (Survey Date: June 23, 1995)



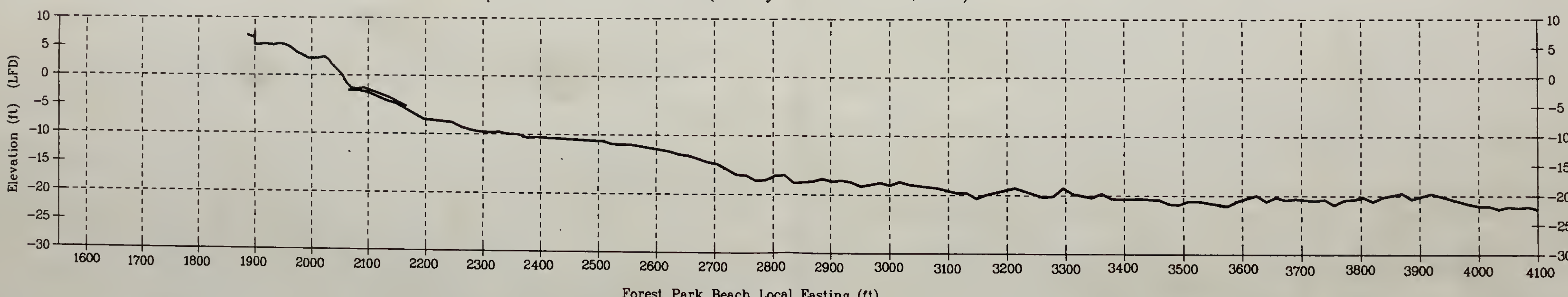
N 7450 (Survey Date: June 23, 1995)

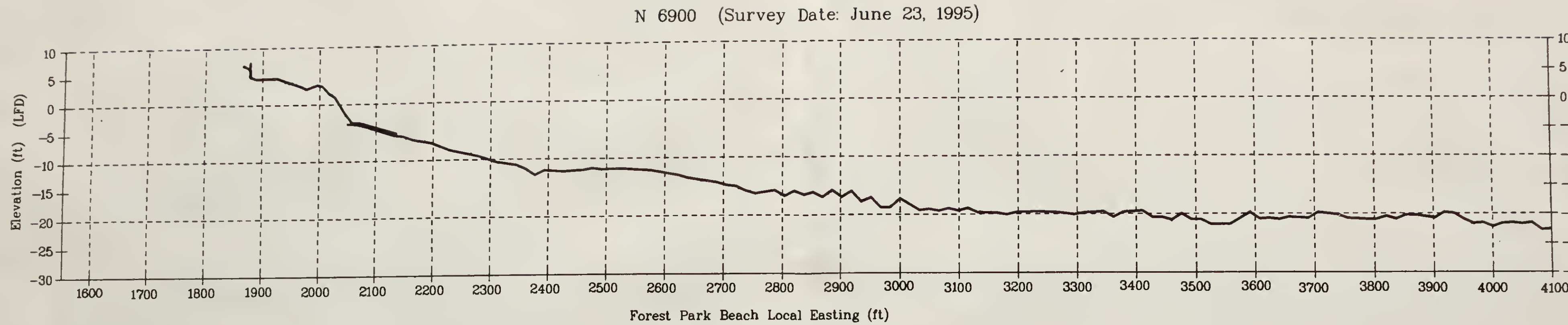


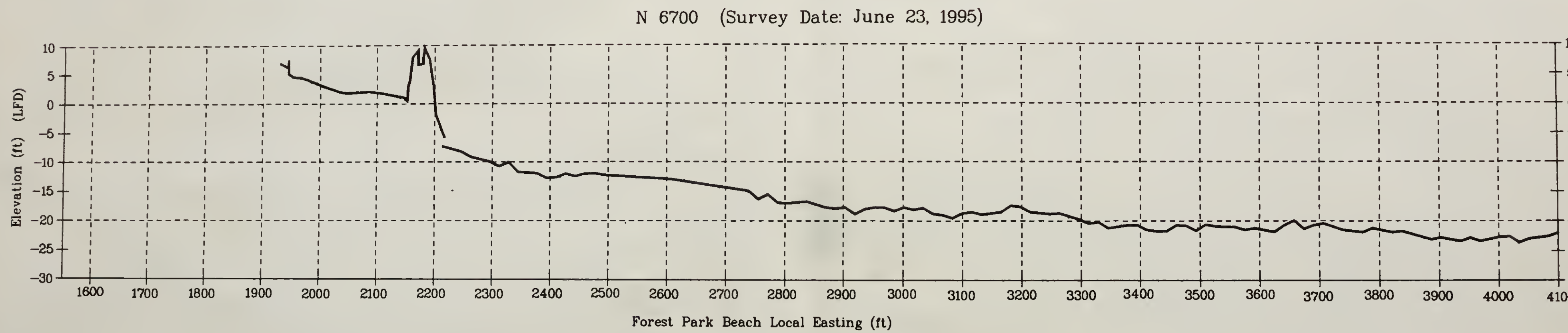
N 7350 (Survey Date: June 24, 1995)

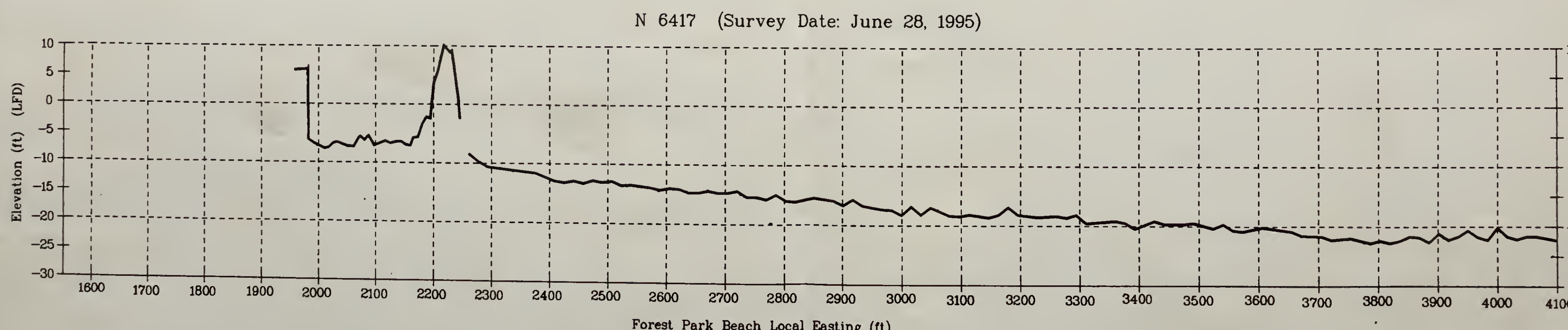


N 7000 (Survey Date: June 23, 1995)

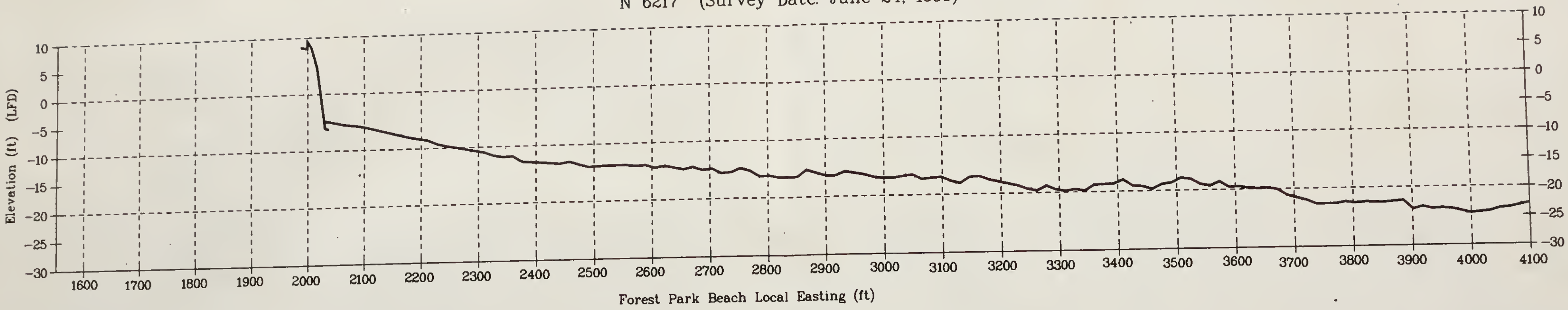



N 6900 (Survey Date: June 23, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

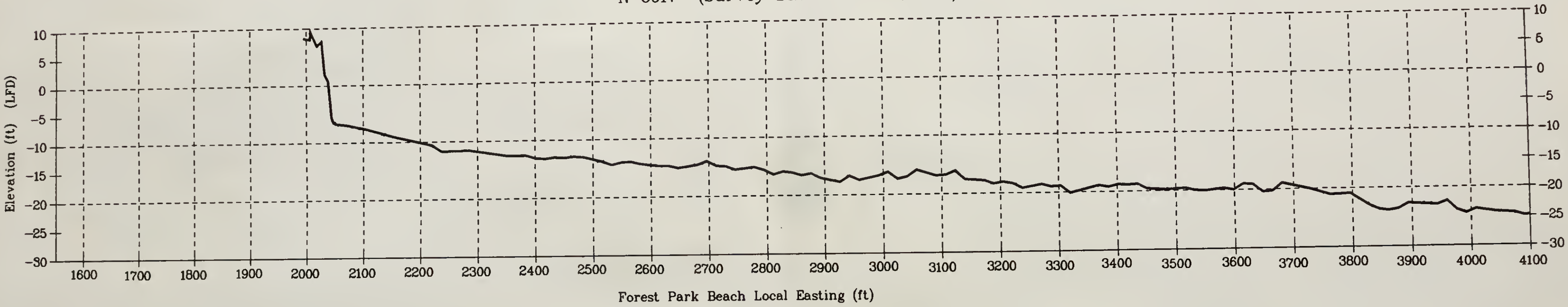

N 6700 (Survey Date: June 23, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 6417 (Survey Date: June 28, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

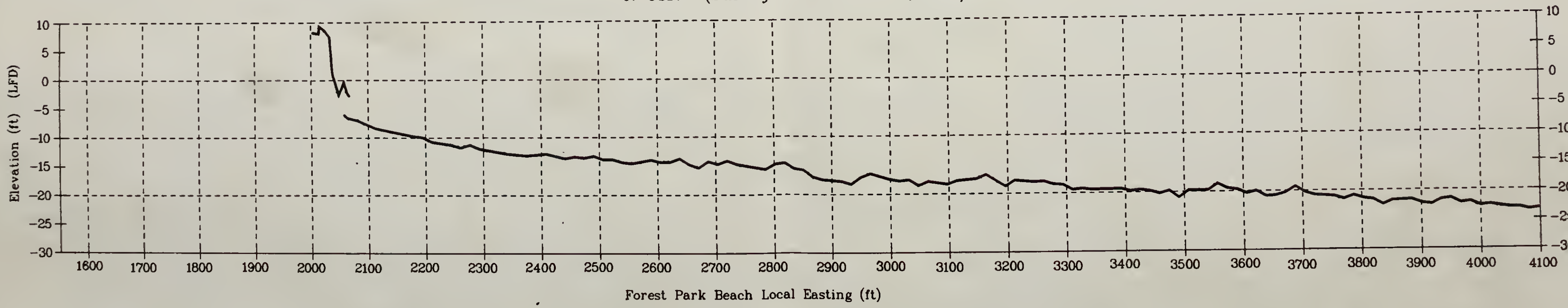
N 6217 (Survey Date: June 24, 1995)

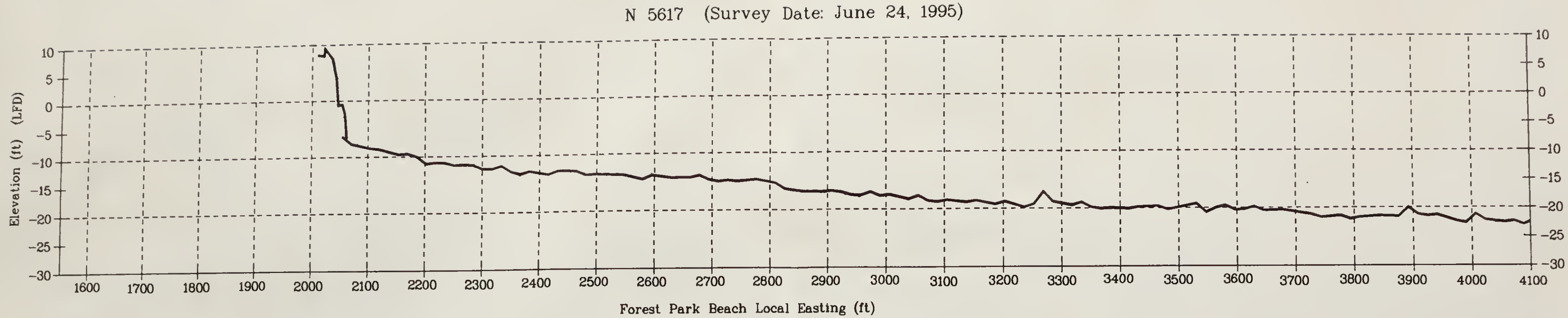


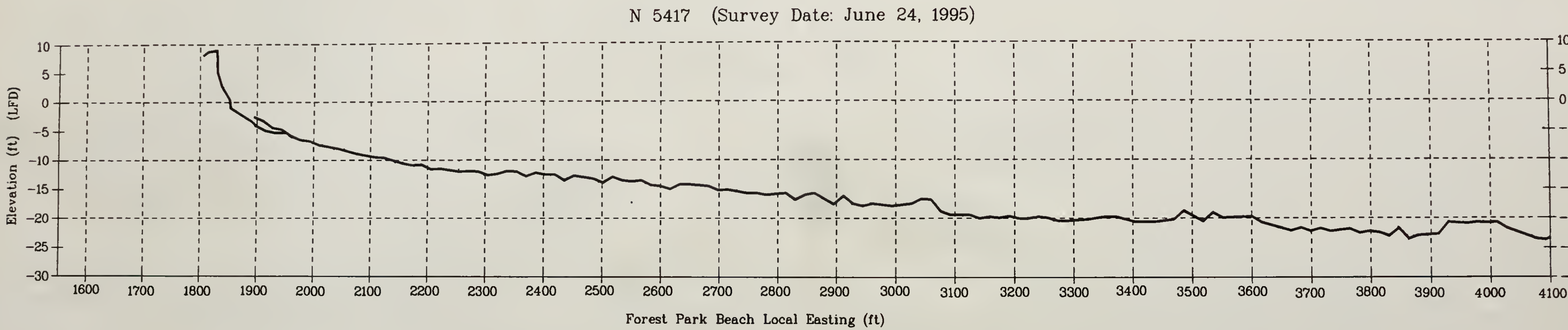
N 6017 (Survey Date: June 24, 1995)

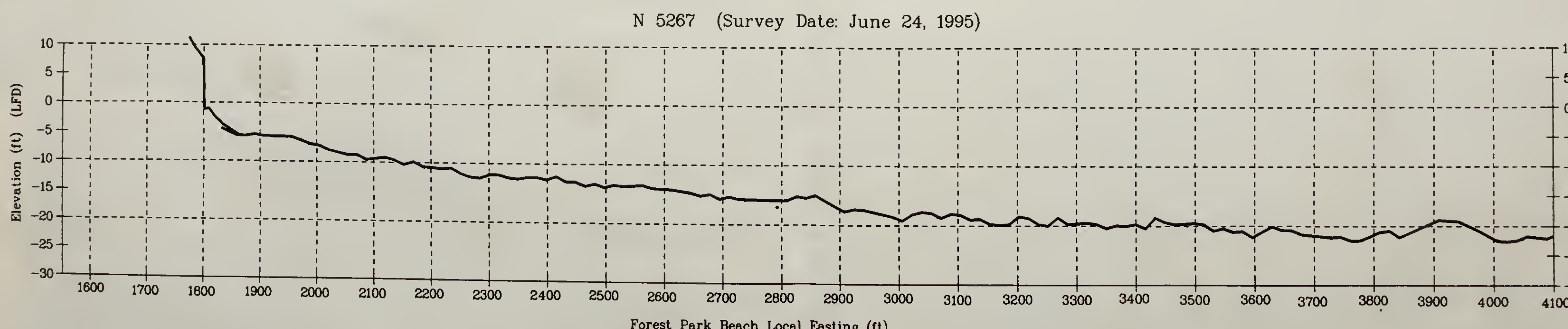


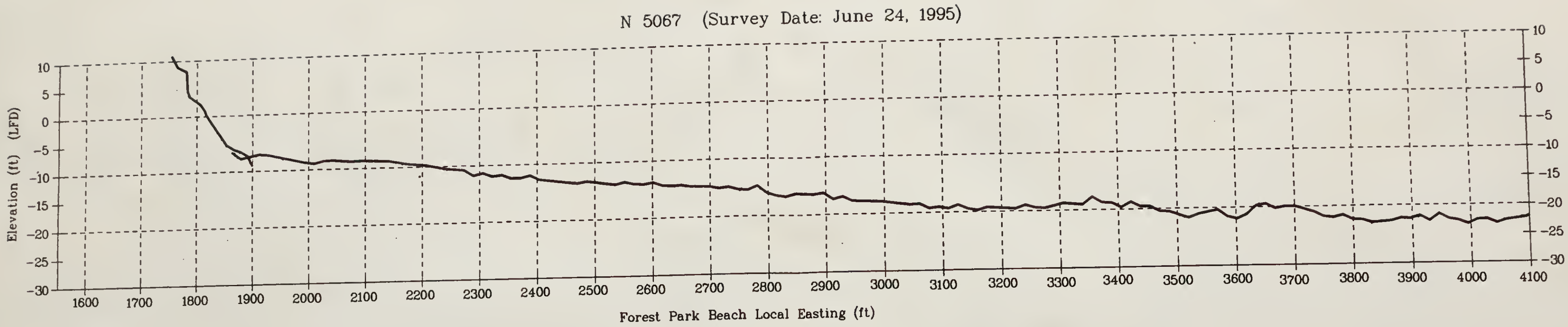
N 5817 (Survey Date: June 24, 1995)

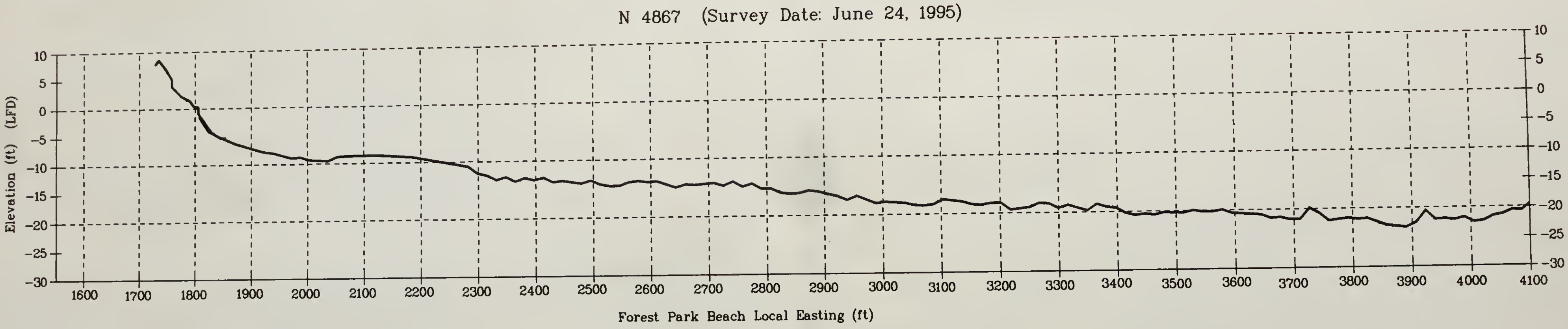


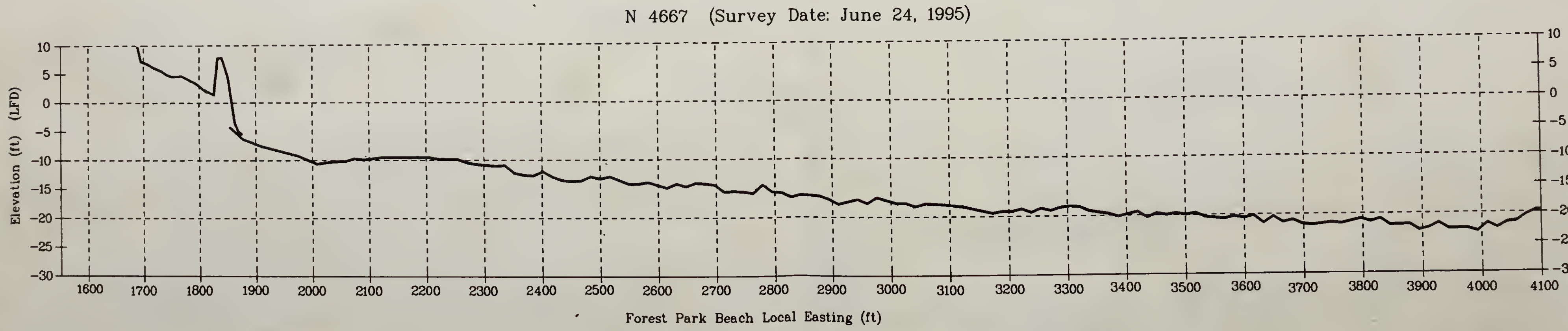

N 5617 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100


N 5417 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100


N 5267 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100


N 5067 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

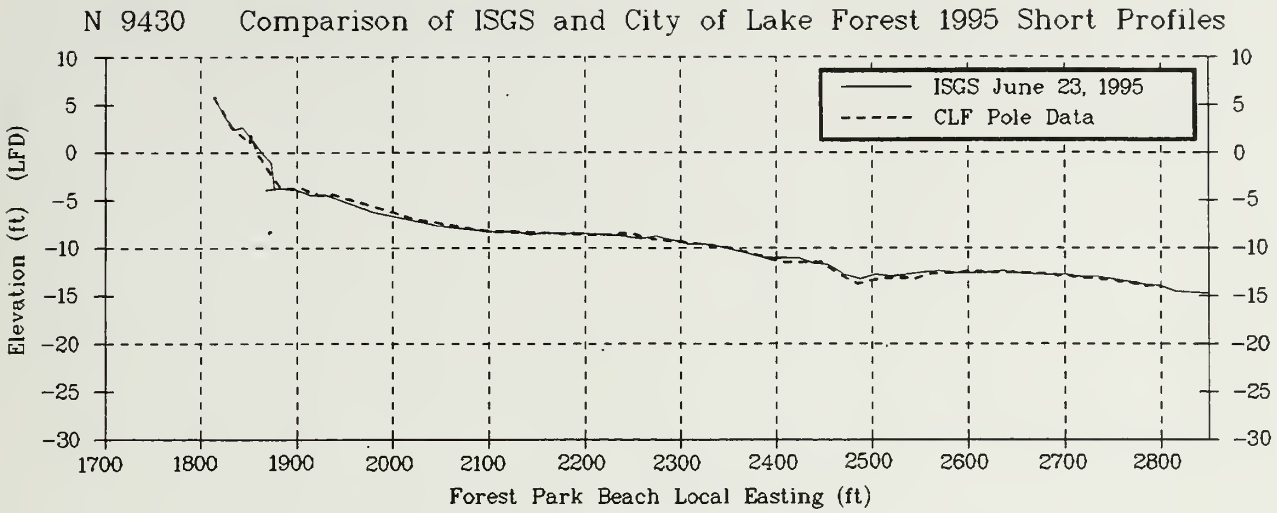

N 4867 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

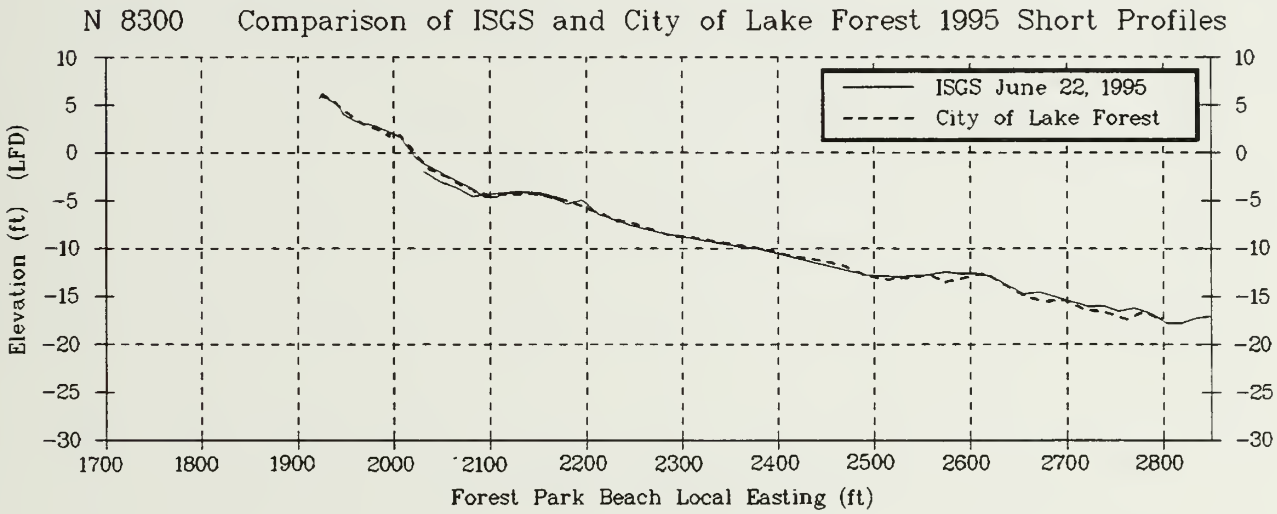

N 4667 (Survey Date: June 24, 1995)
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

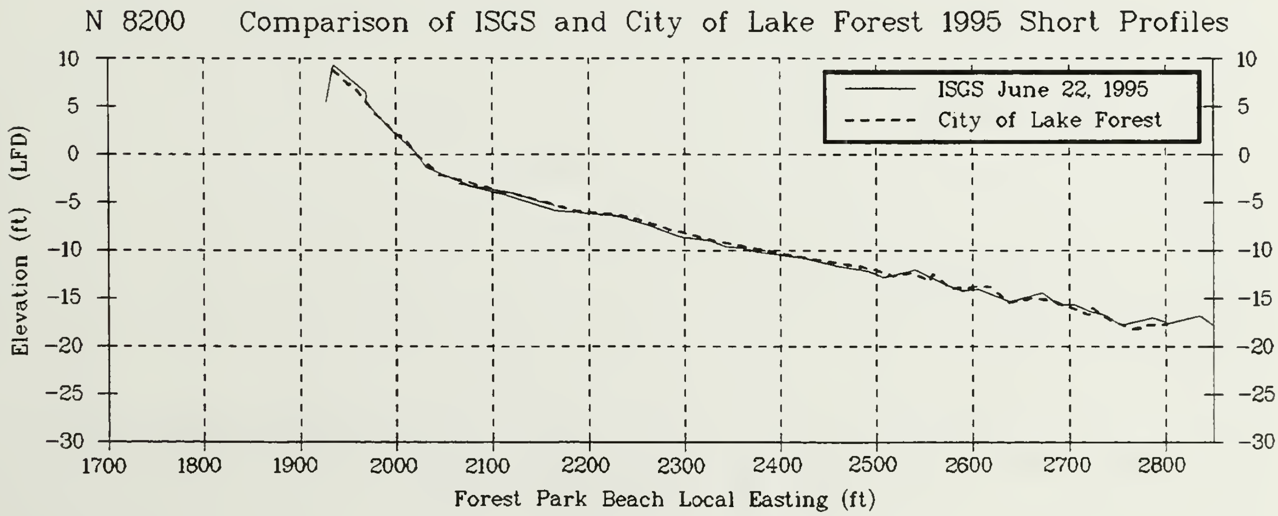
APPENDIX C COMPARISON OF ISGS AND CITY OF LAKE FOREST 1995 BEACH AND NEARSHORE (SHORT) PROFILES

These profiles compare the 1995 ISGS short profile data, which duplicated lines run by the City of Lake Forest. All City of Lake Forest data were collected with prism pole and total station. ISGS data were collected with prism pole and total station to a depth of about 5 ft LFD. Beyond this depth, ISGS data are from fathometer records. In terms of vertical accuracy, the City of Lake Forest prism-pole data take precedence over ISGS fathometer data.

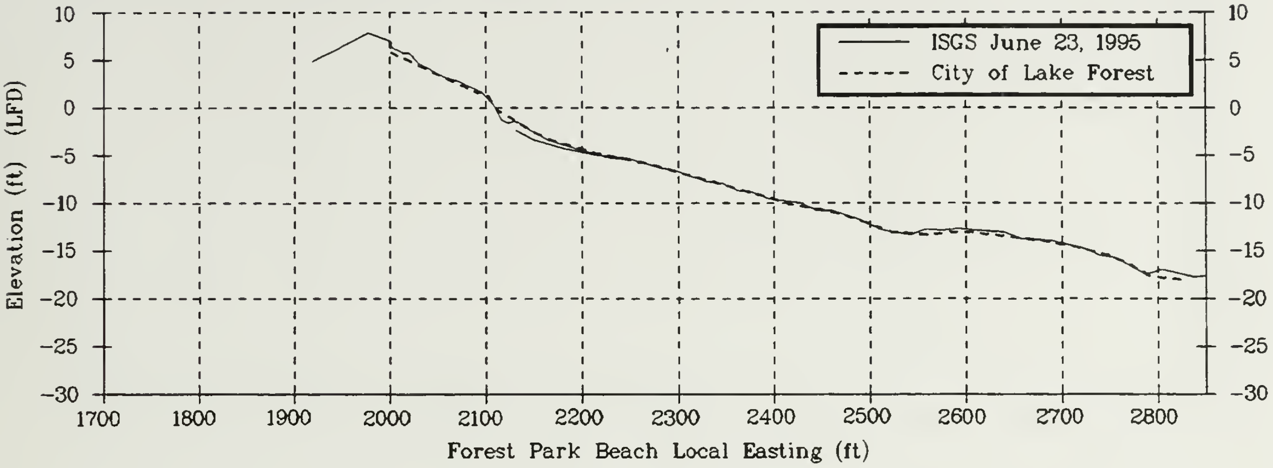
Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.


N 9430 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
CLF Pole Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

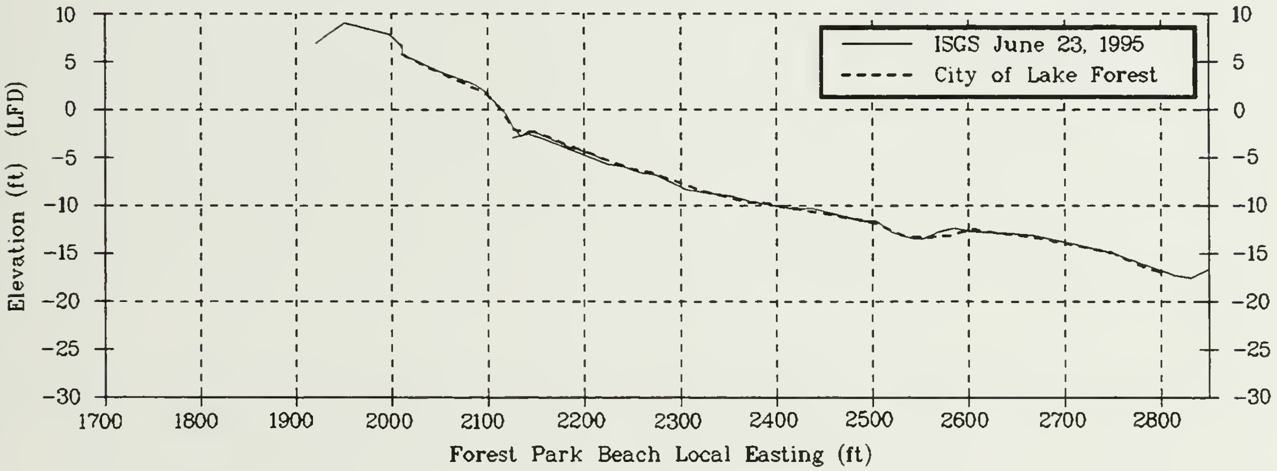

N 8300 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 22, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 8200 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 22, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

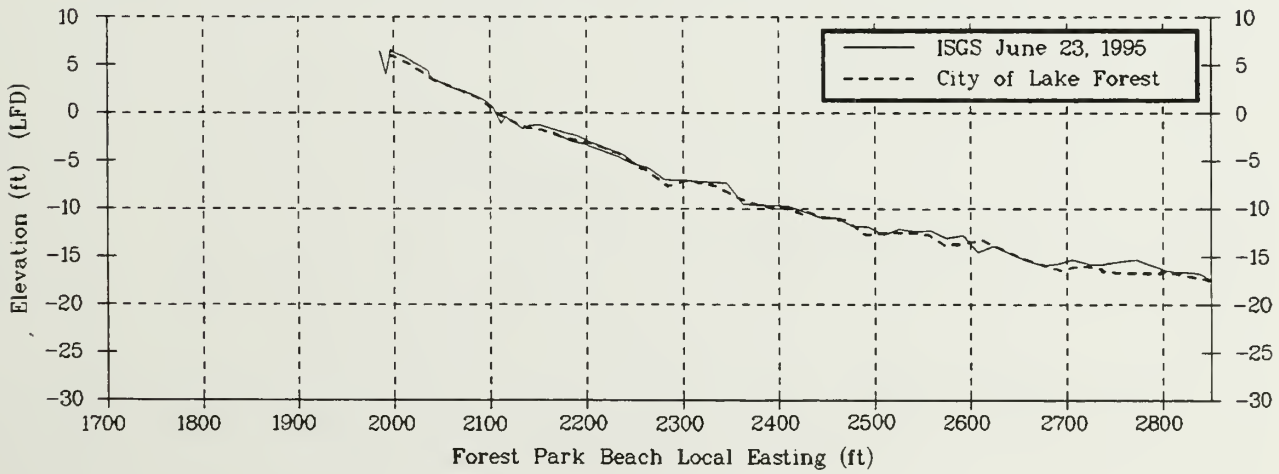
N 7850 Comparison of ISGS and City of Lake Forest 1995 Short Profiles

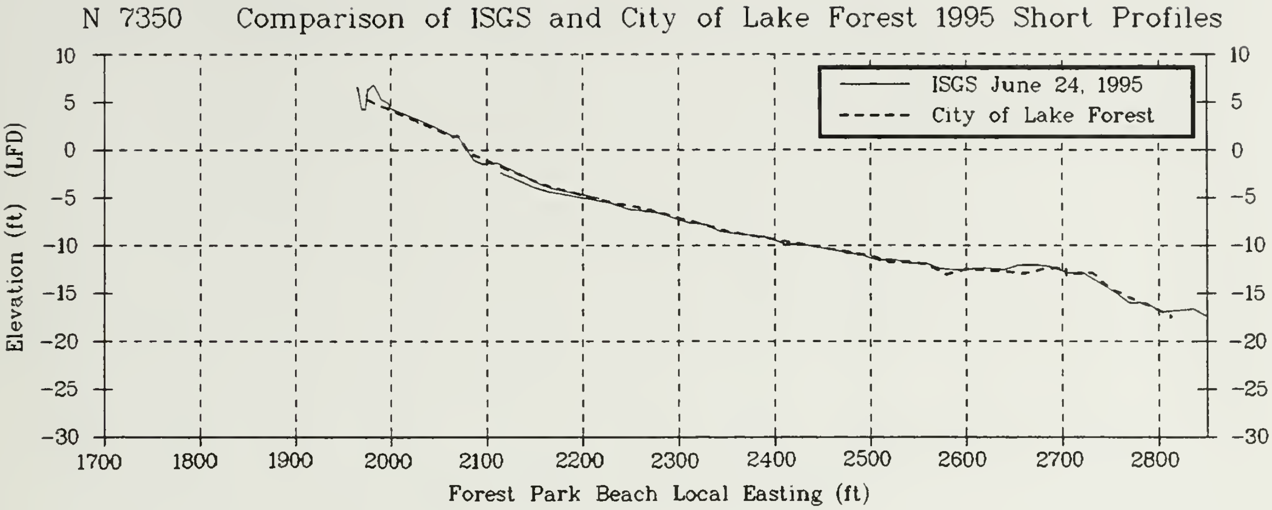


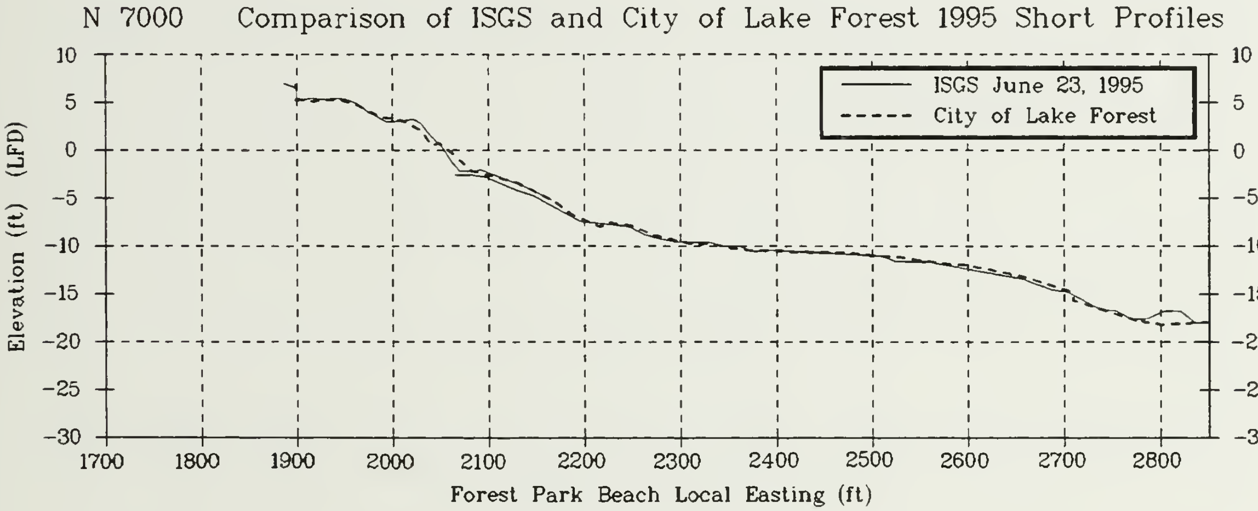
N 7750 Comparison of ISGS and City of Lake Forest 1995 Short Profiles

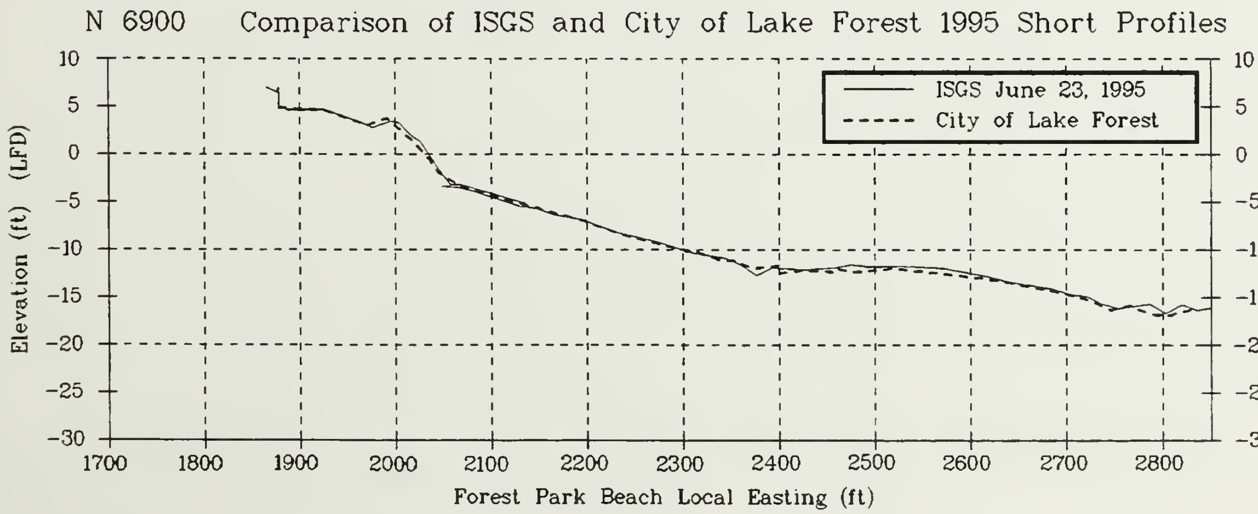


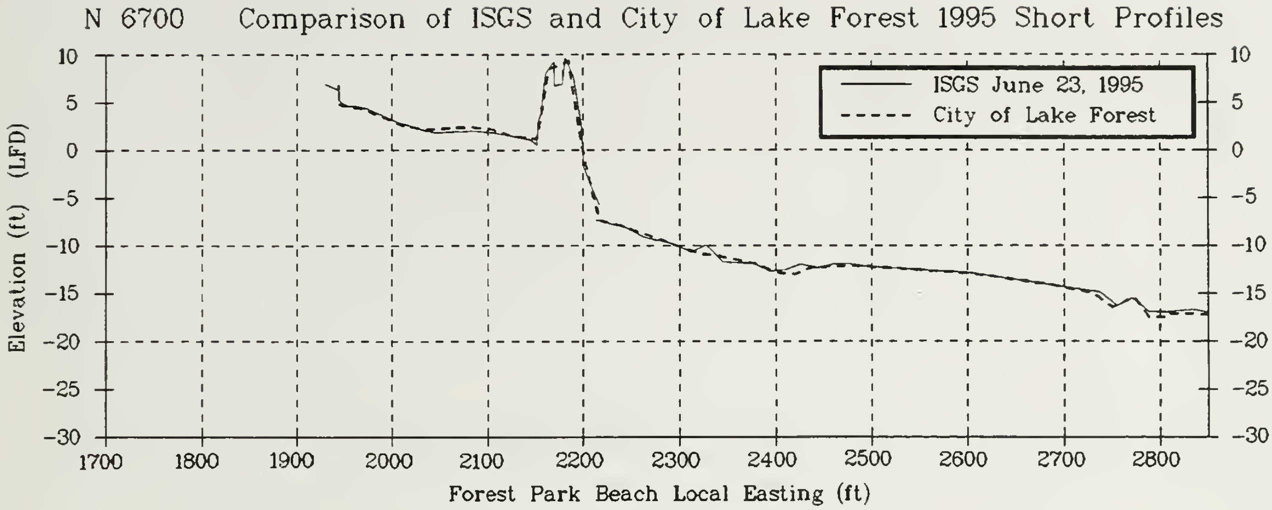
N 7450 Comparison of ISGS and City of Lake Forest 1995 Short Profiles

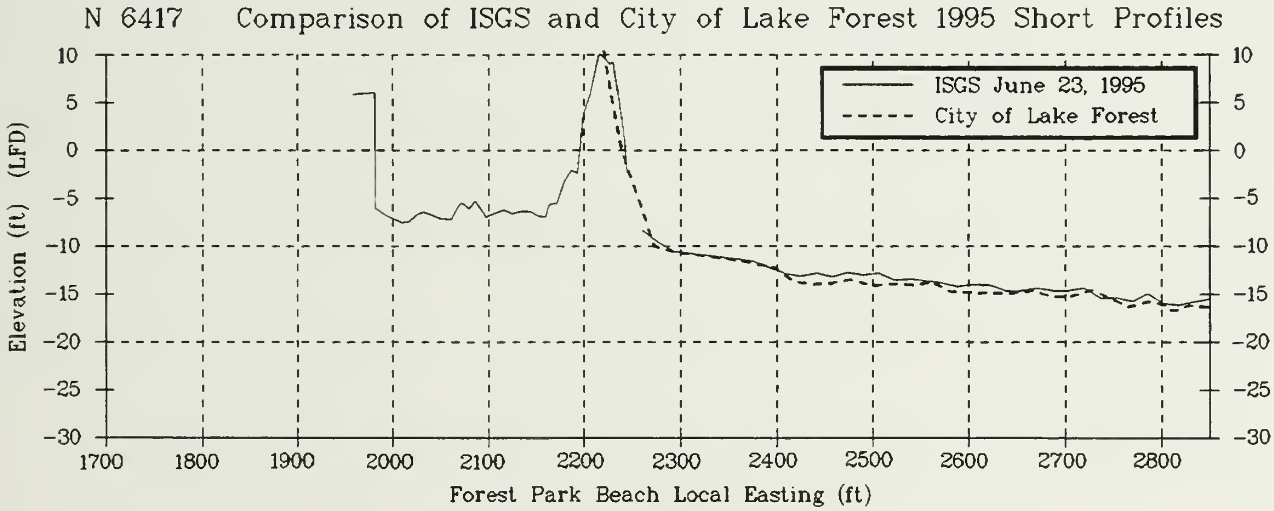


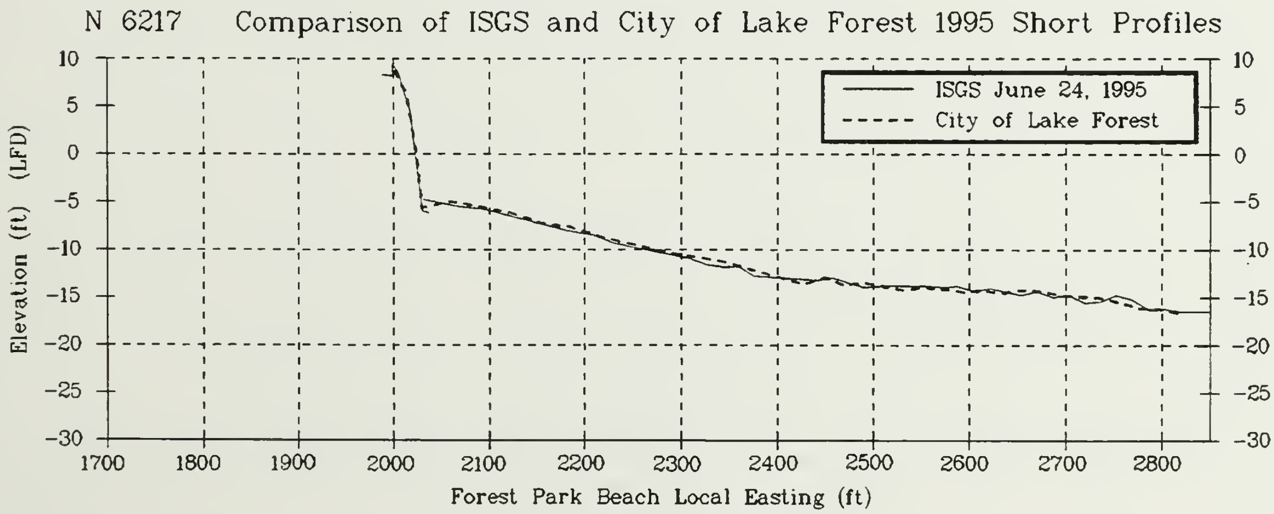

N 7350 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

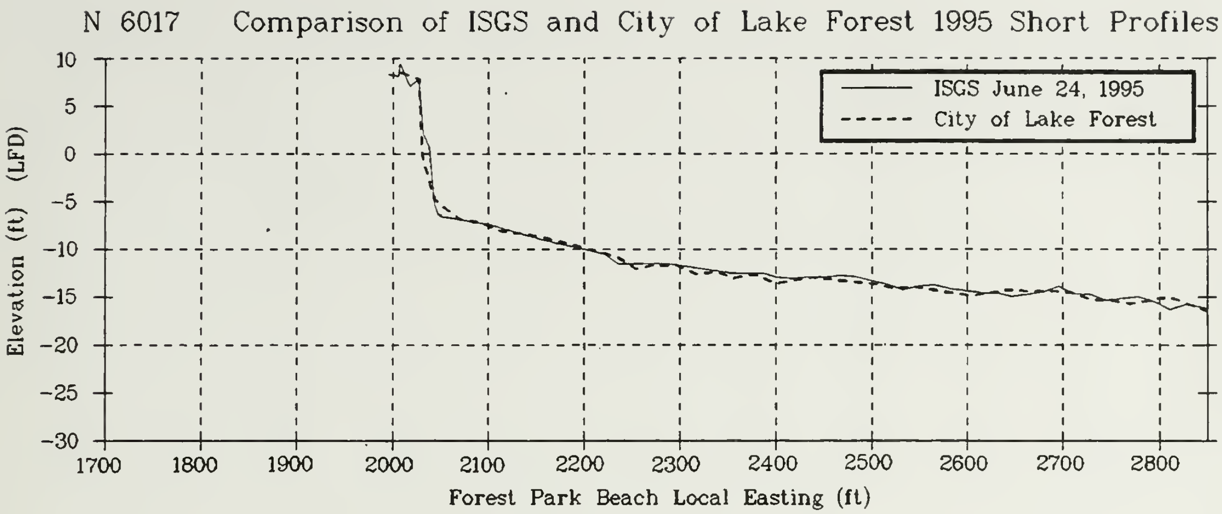

N 7000 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

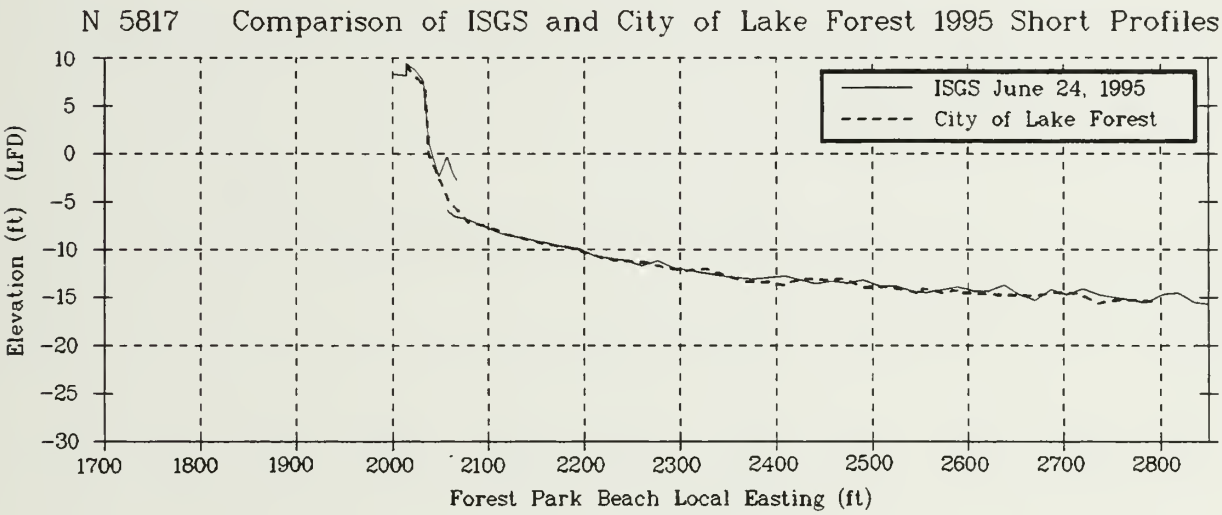

N 6900 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

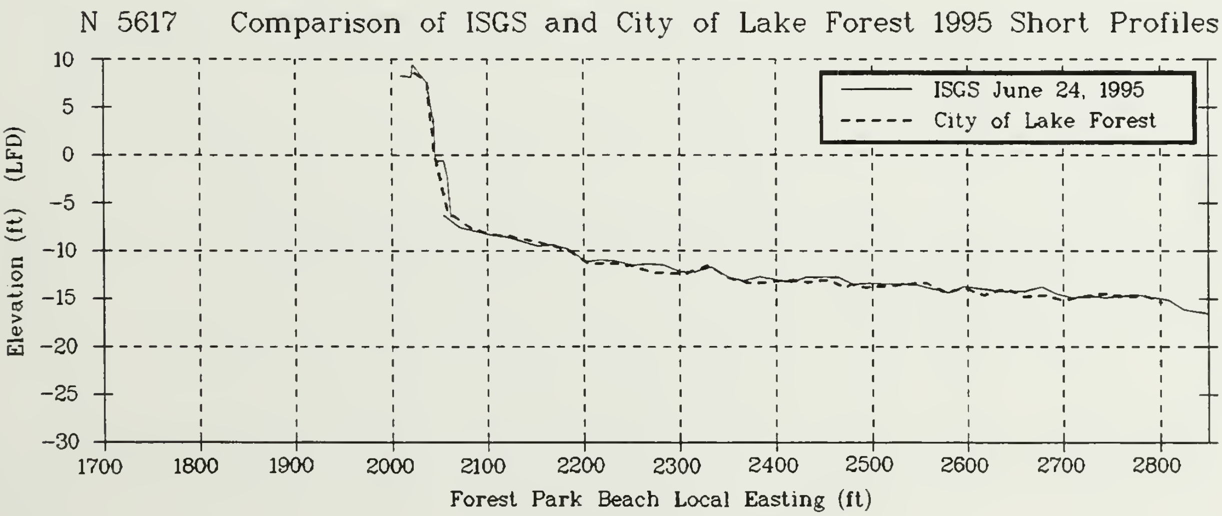

N 6700 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

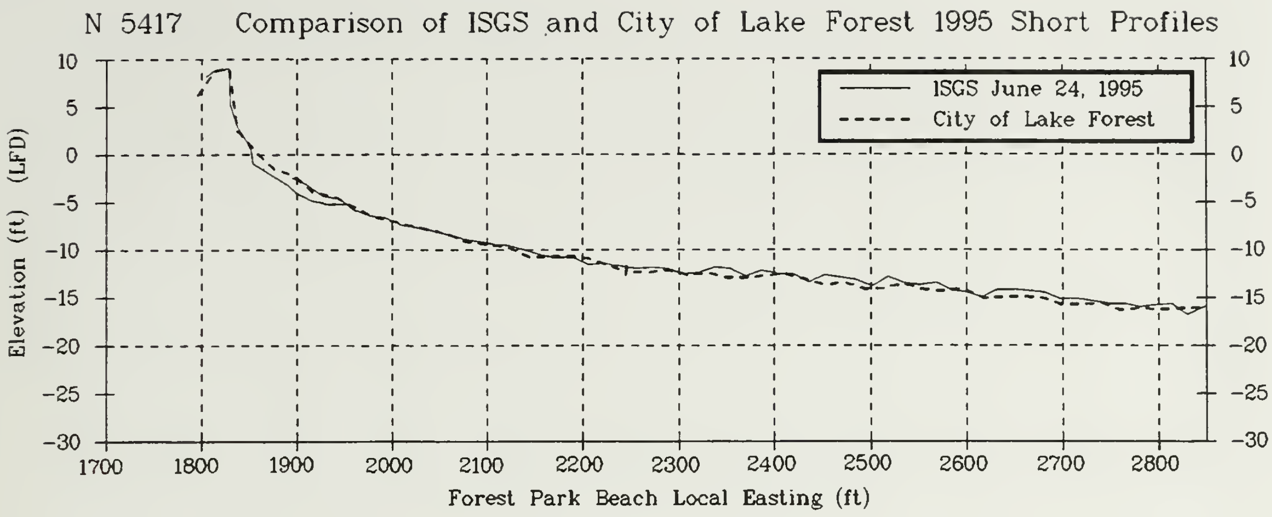

N 6417 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

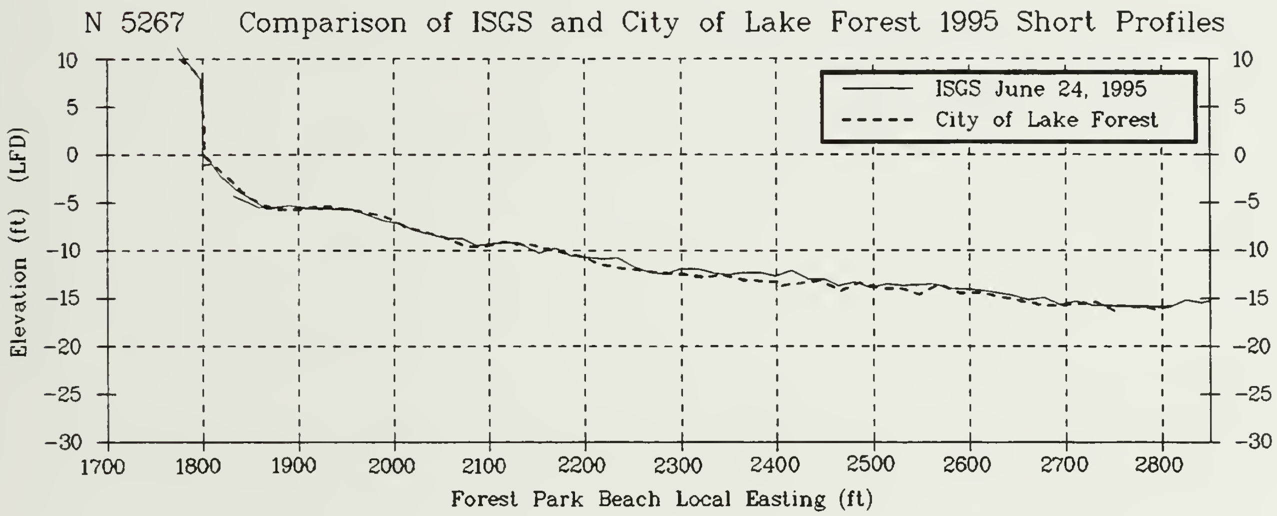

N 6217 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

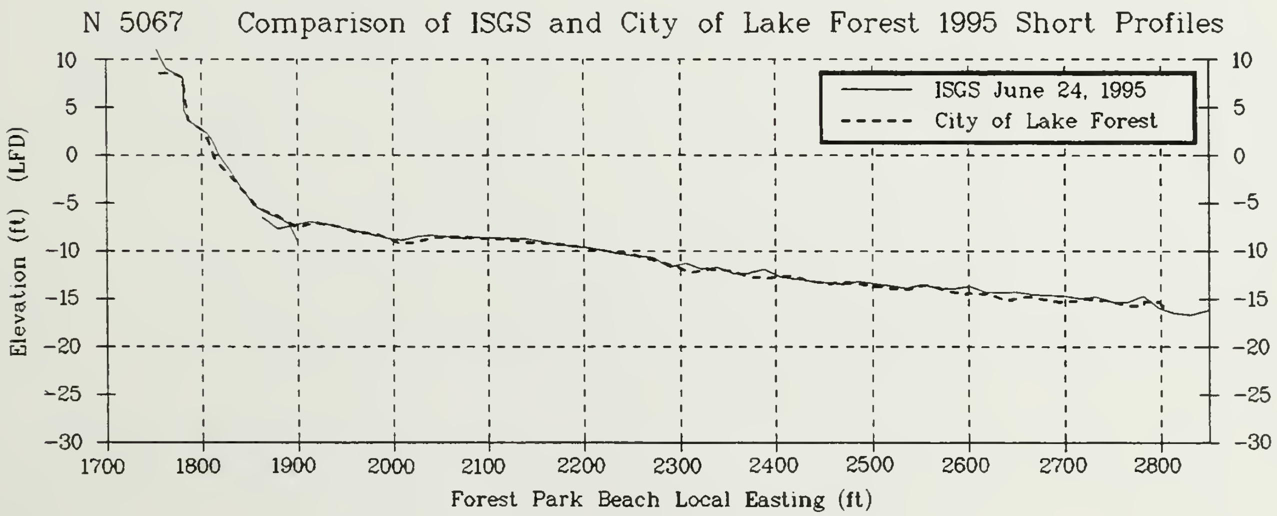

N 6017 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 5817 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

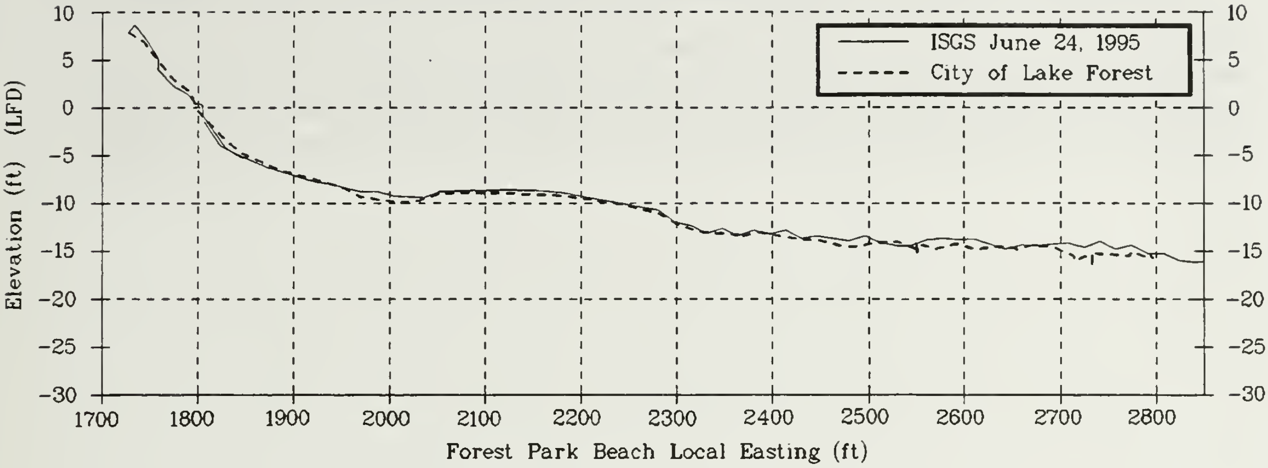

N 5617 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 5417 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
−5
−10
−15
−20
−25
−30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

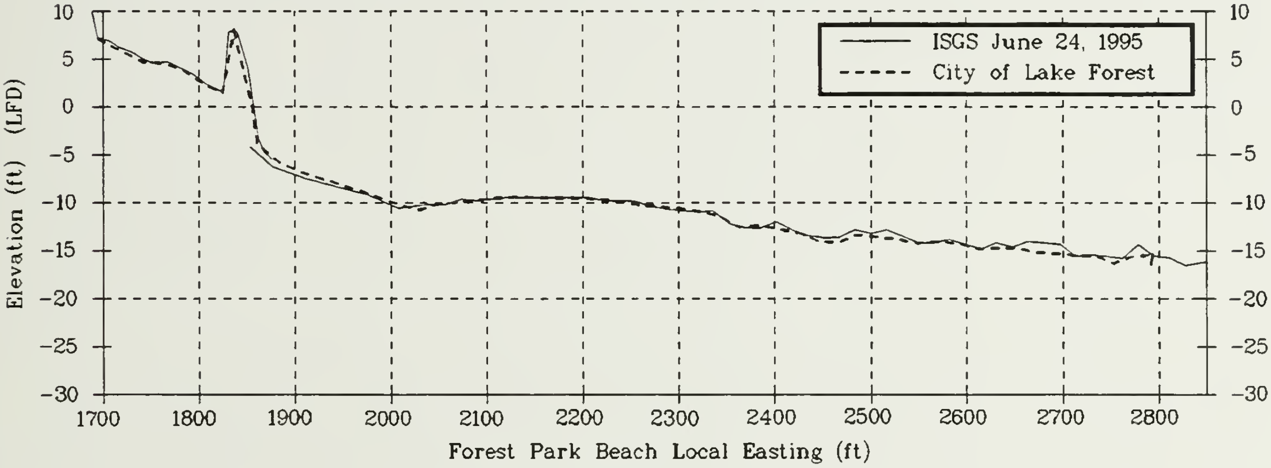

N 5267 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
−5
−10
−15
−20
−25
−30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800


N 5067 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
City of Lake Forest
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
−5
−10
−15
−20
−25
−30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

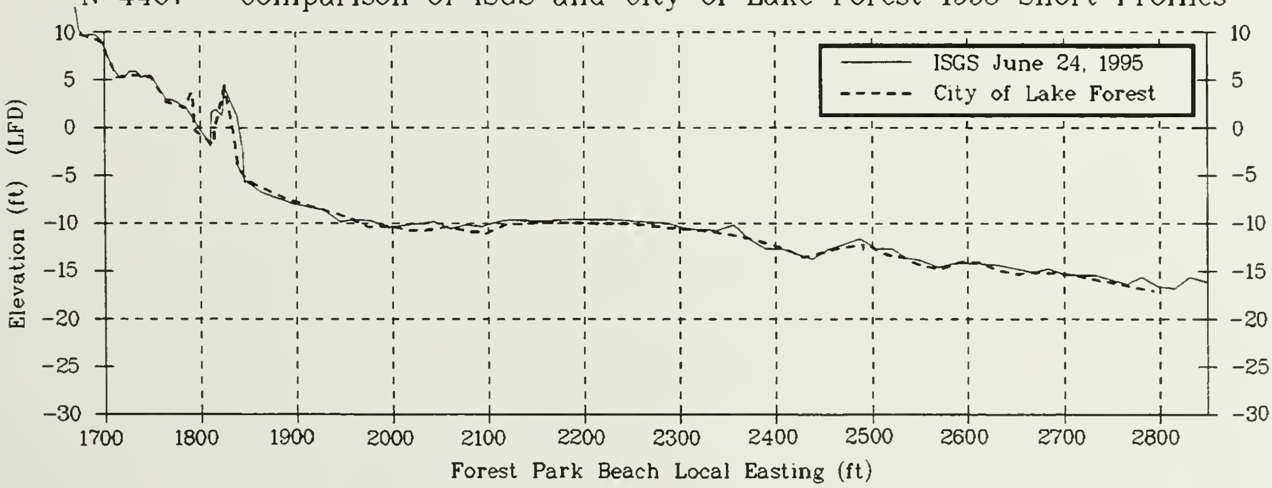
N 4867 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



N 4667 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



N 4467 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



APPENDIX D CALCULATIONS OF ACCRETION AND EROSION AT FOREST PARK BEACH

The tables included in this appendix contain the individual calculations of accretion and erosion volumes by intervals from the lake-bottom change maps created using the TIN method. Data are compiled in half-foot vertical increments from 0.0 to 3.0 ft (0 to 0.9 m). For example, when the threshold is 1.0 ft (0.3 m), volumes given represent accretion and erosion greater than 1.0 ft (0.3 m). Volumes are rounded to the nearest 100 cu yd.

Table D1 Accretion and erosion at Forest Park Beach in the updrift zone, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1994	0.00	30,000	18,900	+11,100
	0.5	10,800	5,800	+5,000
	1.0	4,500	1,600	+2,900
	1.5	1,800	300	+1,500
	2.0	900	0.00	+900
	2.5	400	0.00	+400
	3.0	100	0.00	+100
1994 to 1995	0.0	1,600	3,600	–2,000
	0.5	200	400	–200
	1.0	0	100	–100
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1987 to 1995	0.0	31,600	22,400	+9,200
	0.5	11,000	6,200	+4,800
	1.0	4,500	1,700	+2,800
	1.5	1,800	300	+1,500
	2.0	900	0.00	+900
	2.5	400	0.00	+400
	3.0	100	0.00	+100

Table D2 Accretion and erosion at Forest Park Beach in the beach cells, determined from lake-bottom change maps.				
Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1994	0.00	41,100	23,900	+17,200
	0.5	25,500	11,400	+14,100
	1.0	16,800	6,000	+10,800
	1.5	11,000	3,200	+7,800
	2.0	6,800	2,000	+4,800
	2.5	3,900	1,100	+2,800
	3.0	2,100	500	+1,600
1994 to 1995	0.0	4,200	5,400	–1,200
	0.5	900	500	+400
	1.0	100	100	0
	1.5	0	100.00	–100
	2.0	0	0.00	0
	2.5	0	0.00	0
	3.0	0	0.00	0
1987 to 1995	0.0	45,300	29,300	+16,000
	0.5	26,400	11,900	+10,800
	1.5	16,900	6,100	+10,800
	1.5	11,000	3,300	+7,700
	2.0	6,800	2,000	+4,800
	2.5	3,900	1,100	+2,800
	3.0	2,100	500	+1,600

Table D3 Accretion and erosion at Forest Park Beach in the lakeward perimeter, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1994	0.00	83,200	13,600	+69,600
	0.5	50,000	3,100	+46,900
	1.0	33,000	1,100	+31,900
	1.5	21,600	600	+21,000
	2.0	13,400	200	+13,200
	2.5	7,800	100	+7,700
	3.0	4,800	0.00	+4,800
1994 to 1995	0.0	4,400	7,100	–2,700
	0.5	1,700	1,100	+600
	1.0	800	400	+400
	1.5	500	200	+300
	2.0	400	100	+300
	2.5	300	0	+300
	3.0	300	0	+300
1987 to 1995	0.0	87,600	20,700	+66,900
	0.5	51,700	4,200	+47,500
	1.0	33,800	1,500	+32,300
	1.5	22,100	800	+21,300
	2.0	13,800	300	+13,500
	2.5	8,100	100	+8,100
	3.0	5,100	0.00	+5,100

Table D4 Accretion and erosion at Forest Park Beach in the southern lakeward perimeter, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1994	0.00	17,400	19,100	–1,700
	0.5	5,700	8,100	–2,400
	1.0	2,400	4,100	–1,700
	1.5	1,000	2,100	–1,100
	2.0	500	1,000	–500
	2.5	200	300	–100
	3.0	100	0.00	+100
1994 to 1995	0.0	1,400	9,000	–7,600
	0.5	400	1,500	–1,100
	1.0	0	300	–300
	1.5	0	100	–100
	2.0	0	0	0.00
	2.5	0	0	0.00
	3.0	0.00	0.00	0.00
1987 to 1995	0.0	18,800	28,100	–9,300
	0.5	6,100	9,600	–3,500
	1.5	2,400	4,400	–2,000
	1.5	1,000	2,200	–1,200
	2.0	500	1,000	–500
	2.5	200	300	–100
	3.0	100	0.00	+100

Table D5 Accretion and erosion at Forest Park Beach in the downdrift zone, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1994	0.00	24,000	33,400	–9,400
	0.5	4,100	19,600	–15,500
	1.0	900	11,600	–10,700
	1.5	100	5,100	–5,000
	2.0	0.00	2,300	–2,300
	2.5	0.00	700	–700
	3.0	0.00	300	–300
1994 to 1995	0.0	900	10,600	–9,700
	0.5	0	900	–900
	1.0	0	300	–300
	1.5	0	100	–100
	2.0	0	0	0.00
	2.5	0	0	0.00
	3.0	0	0	0.00
1987 to 1995	0.0	24,900	44,000	–19,100
	0.5	4,100	20,500	–16,400
	1.0	900	11,900	–11,000
	1.5	100	5,200	–5,100
	2.0	0.00	2,300	–2,300
	2.5	0.00	700	–700
	3.0	0.00	300	–300

APPENDIX E TABULAR DATA FOR ISGS 1995 PRISM-POLE SURVEYS AND FATHOMETER SURVEYS

All data are referenced to Lake Forest Datum (LFD) for an elevation reference, and to Low Water Datum (LWD) for a water-depth reference. These data extend offshore to 450 to 500 m (1,476 to 1,640 ft) from the onshore Mini-Ranger station.

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9430

June 23, 1995
Start/End Time: 0943/0953 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1815.797
Low Water Datum [LWD] Correction feet −2.28

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2037091.620	638123.939	5.617	7.677
	2037094.838	638134.006	3.579	5.639
	2037098.666	638143.842	2.315	4.375
	2037101.260	638150.942	2.564	4.624
	2037104.303	638155.850	1.796	3.856
	2037109.483	638169.863	−0.177	1.883
	2037112.643	638177.944	−1.085	0.975
	2037114.145	638181.415	−4.033	−1.973
Fathometer Data				
16	2037110	638173	−4.0	−1.9
20	2037115	638185	−3.8	−1.7
25	2037121	638201	−3.9	−1.8
30	2037126	638216	−4.5	−2.4
35	2037132	638231	−4.5	−2.4
40	2037138	638247	−5.2	−3.1
45	2037144	638262	−5.6	−3.5
50	2037150	638277	−6.3	−4.2
55	2037156	638293	−6.7	−4.6
60	2037161	638308	−6.9	−4.8
65	2037167	638323	−7.3	−5.2
70	2037173	638339	−7.7	−5.6
75	2037179	638354	−7.8	−5.7
80	2037185	638369	−8.0	−5.9
85	2037190	638385	−8.3	−6.2
90	2037196	638400	−8.4	−6.3
95	2037202	638415	−8.3	−6.2
100	2037208	638431	−8.7	−6.6
105	2037214	638446	−8.4	−6.3
110	2037220	638461	−8.6	−6.5
115	2037225	638477	−8.5	−6.4
120	2037231	638492	−8.7	−6.6
125	2037237	638507	−8.7	−6.6
130	2037243	638523	−8.8	−6.7
135	2037249	638538	−9.1	−7.0
140	2037254	638553	−8.8	−6.7
145	2037260	638569	−9.3	−7.2
150	2037266	638584	−9.6	−7.5
155	2037272	638599	−9.6	−7.5
160	2037278	638615	−9.9	−7.8
165	2037284	638630	−10.3	−8.2
170	2037289	638645	−10.6	−8.5
175	2037295	638661	−11.1	−9.0
180	2037301	638676	−11.0	−8.9
185	2037307	638691	−11.0	−8.9
190	2037313	638707	−11.6	−9.5
195	2037318	638722	−11.8	−9.7
200	2037324	638737	−12.8	−10.7
205	2037330	638753	−13.3	−11.2
210	2037336	638768	−12.8	−10.7
215	2037342	638783	−13.0	−10.9
220	2037348	638799	−12.8	−10.7
225	2037353	638814	−12.7	−10.6
230	2037359	638830	−12.4	−10.3
235	2037365	638845	−12.6	−10.5
240	2037371	638860	−12.6	−10.5
245	2037377	638876	−12.6	−10.5
250	2037382	638891	−12.4	−10.3
255	2037388	638906	−12.7	−10.6
260	2037394	638922	−12.7	−10.6
265	2037400	638937	−12.9	−10.8
270	2037406	638952	−12.8	−10.7
275	2037412	638968	−13.1	−11.0
280	2037417	638983	−13.0	−10.9
285	2037423	638998	−13.3	−11.2
290	2037429	639014	−13.6	−11.5
295	2037435	639029	−13.9	−11.8
300	2037441	639044	−14.0	−11.9
305	2037446	639060	−14.6	−12.5
310	2037452	639075	−14.7	−12.6
315	2037458	639090	−14.8	−12.7
320	2037464	639106	−15.5	−13.4
325	2037470	639121	−16.0	−13.9
330	2037476	639136	−16.3	−14.2
335	2037481	639152	−16.5	−14.4
340	2037487	639167	−16.9	−14.8
345	2037493	639182	−16.8	−14.7
350	2037499	639198	−17.0	−14.9
355	2037505	639213	−17.1	−15.0
360	2037510	639228	−18.0	−15.9
365	2037516	639244	−17.6	−15.5
370	2037522	639259	−17.3	−15.2
375	2037528	639274	−17.8	−15.7
380	2037534	639290	−17.8	−15.7
385	2037540	639305	−18.7	−16.6
390	2037545	639320	−17.8	−15.7
395	2037551	639336	−17.8	−15.7
400	2037557	639351	−18.8	−16.7
405	2037563	639366	−18.8	−16.7
410	2037569	639382	−19.5	−17.4
415	2037575	639397	−20.0	−17.9
420	2037580	639412	−19.8	−17.7
425	2037586	639428	−18.8	−16.7
430	2037592	639443	−19.5	−17.4
435	2037598	639458	−19.8	−17.7
440	2037604	639474	−20.6	−18.5
445	2037609	639489	−21.0	−18.9
450	2037615	639504	−21.0	−18.9

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9230

June 23, 1995
Start/End Time 0925/0932 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1848.011
Low Water Datum [LWD] Correction feet −2.28

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036908.402	638196.665	8.827	10.887
	2036909.231	638210.524	5.361	7.421
	2036911.715	638215.665	4.638	6.698
	2036914.007	638221.942	3.217	5.277
	2036916.154	638224.969	3.438	5.498
	2036919.670	638231.568	1.938	3.998
	2036921.148	638235.759	1.764	3.824
	2036928.443	638250.248	−0.101	1.959
	2036931.571	638257.830	−1.065	0.995
	2036935.971	638275.074	−3.193	−1.133
	2036937.848	638281.391	−3.551	−1.491
	2036940.368	638289.337	−3.181	−1.121
	2036945.384	638300.562	−3.053	−0.993
	2036950.242	638311.969	−3.474	−1.414
	2036953.274	638322.199	−3.985	−1.925
	2036958.485	638333.786	−4.506	−2.446
	2036964.081	638345.002	−4.975	−2.915
	2036966.186	638348.978	−5.132	−3.072
Fathometer Data				
10	2036928	638256	−2.5	−0.4
15	2036933	638271	−3.7	−1.6
20	2036939	638286	−3.2	−1.1
25	2036945	638302	−3.6	−1.5
30	2036951	638317	−4.3	−2.2
35	2036957	638332	−4.9	−2.8
40	2036962	638348	−5.4	−3.3
45	2036968	638363	−5.8	−3.7
50	2036974	638378	−6.1	−4.0
55	2036980	638394	−6.7	−4.6
60	2036986	638409	−7.0	−4.9
65	2036992	638424	−7.2	−5.1
70	2036997	638440	−7.4	−5.3
75	2037003	638455	−7.6	−5.5
80	2037009	638470	−7.8	−5.7
85	2037015	638486	−7.8	−5.7
90	2037021	638501	−7.8	−5.7
95	2037027	638516	−8.0	−5.9
100	2037032	638532	−8.0	−5.9
105	2037038	638547	−8.0	−5.9
110	2037044	638562	−8.3	−6.2
115	2037050	638578	−8.1	−6.0
120	2037056	638593	−8.3	−6.2
125	2037061	638608	−8.5	−6.4
130	2037067	638624	−8.6	−6.5
135	2037073	638639	−8.8	−6.7
140	2037079	638654	−9.0	−6.9
145	2037085	638670	−9.3	−7.2
150	2037091	638685	−9.6	−7.5
155	2037096	638701	−9.8	−7.7
160	2037102	638716	−10.0	−7.9
165	2037108	638731	−10.5	−8.4
170	2037114	638747	−10.8	−8.7
175	2037120	638762	−11.3	−9.2
180	2037125	638777	−11.8	−9.7
185	2037131	638793	−12.1	−10.0
190	2037137	638808	−12.3	−10.2
195	2037143	638823	−11.9	−9.8
200	2037149	638839	−11.9	−9.8
205	2037155	638854	−12.5	−10.4
210	2037160	638869	−12.8	−10.7
215	2037166	638885	−13.3	−11.2
220	2037172	638900	−13.1	−11.0
225	2037178	638915	−13.3	−11.2
230	2037184	638931	−13.4	−11.3
235	2037189	638946	−13.8	−11.7
240	2037195	638961	−13.9	−11.8
245	2037201	638977	−14.5	−12.4
250	2037207	638992	−14.8	−12.7
255	2037213	639007	−15.1	−13.0
260	2037219	639023	−15.4	−13.3
265	2037224	639038	−15.5	−13.4
270	2037230	639053	−15.4	−13.3
275	2037236	639069	−16.1	−14.0
280	2037242	639084	−16.1	−14.0
285	2037248	639099	−16.6	−14.5
290	2037253	639115	−16.4	−14.3
295	2037259	639130	−17.0	−14.9
300	2037265	639145	−16.9	−14.8
305	2037271	639161	−17.1	−15.0
310	2037277	639176	−17.0	−14.9
315	2037283	639191	−17.1	−15.0
320	2037288	639207	−17.6	−15.5
325	2037294	639222	−17.6	−15.5
330	2037300	639237	−17.6	−15.5
335	2037306	639253	−17.2	−15.1
340	2037312	639268	−17.7	−15.6
345	2037317	639283	−17.5	−15.4
350	2037323	639299	−17.5	−15.4
355	2037329	639314	−18.0	−15.9
360	2037335	639329	−17.8	−15.7
365	2037341	639345	−18.4	−16.3
370	2037347	639360	−18.0	−15.9
375	2037352	639375	−17.8	−15.7
380	2037358	639391	−18.3	−16.2
385	2037364	639406	−19.0	−16.9
390	2037370	639421	−19.8	−17.7
395	2037376	639437	−20.3	−18.2
400	2037381	639452	−20.4	−18.3
405	2037387	639467	−20.8	−18.7
410	2037393	639483	−20.3	−18.2
415	2037399	639498	−19.9	−17.8
420	2037405	639513	−20.0	−17.9
425	2037411	639529	−21.1	−19.0
430	2037416	639544	−20.3	−18.2
435	2037422	639559	−20.0	−17.9
440	2037428	639575	−20.8	−18.7
445	2037434	639590	−20.4	−18.3
450	2037440	639605	−20.3	−18.2
455	2037445	639621	−20.6	−18.5
460	2037451	639636	−20.8	−18.7
465	2037457	639651	−21.1	−19.0
470	2037463	639667	−21.9	−19.8
475	2037469	639682	−21.8	−19.7
480	2037475	639697	−21.8	−19.7
485	2037480	639713	−21.8	−19.7
490	2037486	639728	−22.1	−20.0
495	2037492	639743	−22.5	−20.4
500	2037498	639759	−21.8	−19.7

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N9030

June 23, 1995
Start/End Time: 0902/0909 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1904.740
Low Water Datum [LWD] Correction feet -2.28

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036734.177	638309.944	9.684	11.744
	2036736.815	638316.085	7.188	9.248
	2036737.184	638316.280	4.869	6.929
	2036738.855	638321.642	4.295	6.355
	2036740.597	638327.423	3.346	5.406
	2036743.004	638332.795	2.505	4.565
	2036744.852	638337.311	2.799	4.859
	2036746.786	638340.943	2.229	4.289
	2036750.683	638349.614	0.646	2.706
	2036752.583	638355.769	0.124	2.184
	2036756.565	638365.699	−1.139	0.921
	2036759.905	638375.598	−2.700	−0.640
	2036764.805	638385.661	−3.320	−1.260
	2036768.022	638391.782	−3.776	−1.716
	2036771.868	638398.847	−3.491	−1.431
	2036776.112	638411.290	−3.436	−1.376
	2036776.446	638422.316	−3.590	−1.530
	2036782.170	638433.902	−4.042	−1.982
	2036786.191	638443.018	−4.505	−2.445
	2036791.812	638458.574	−5.115	−3.055
Fathometer Data				
5	2036755	638364	−3.0	−0.9
10	2036761	638380	−3.8	−1.7
15	2036767	638395	−3.4	−1.3
20	2036772	638410	−3.5	−1.4
25	2036778	638426	−4.2	−2.1
30	2036784	638441	−5.0	−2.9
35	2036790	638456	−5.6	−3.5
40	2036796	638472	−5.9	−3.8
45	2036801	638487	−6.1	−4.0
50	2036807	638502	−6.5	−4.4
55	2036813	638518	−6.7	−4.6
60	2036819	638533	−6.9	−4.8
65	2036825	638548	−7.3	−5.2
70	2036831	638564	−7.4	−5.3
75	2036836	638579	−7.6	−5.5
80	2036842	638594	−7.5	−5.4
85	2036848	638610	−7.6	−5.5
90	2036854	638625	−7.8	−5.7
95	2036860	638640	−7.6	−5.5
100	2036865	638656	−8.0	−5.9
105	2036871	638671	−8.1	−6.0
110	2036877	638686	−8.4	−6.3
115	2036883	638702	−8.5	−6.4
120	2036889	638717	−9.0	−6.9
125	2036895	638732	−9.2	−7.1
130	2036900	638748	−9.4	−7.3
135	2036906	638763	−9.9	−7.8
140	2036912	638778	−10.0	−7.9
145	2036918	638794	−10.7	−8.6
150	2036924	638809	−10.8	−8.7
155	2036929	638824	−11.2	−9.1
160	2036935	638840	−11.6	−9.5
165	2036941	638855	−12.8	−10.7
170	2036947	638871	−12.1	−10.0
175	2036953	638886	−12.0	−9.9
180	2036959	638901	−11.4	−9.3
185	2036964	638917	−12.0	−9.9
190	2036970	638932	−12.5	−10.4
195	2036976	638947	−12.8	−10.7
200	2036982	638963	−13.8	−11.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
205	2036988	638978	−13.8	−11.7
210	2036993	638993	−13.8	−11.7
215	2036999	639009	−14.6	−12.5
220	2037005	639024	−15.0	−12.9
225	2037011	639039	−15.6	−13.5
230	2037017	639055	−16.0	−13.9
235	2037023	639070	−15.8	−13.7
240	2037028	639085	−15.8	−13.7
245	2037034	639101	−15.0	−12.9
250	2037040	639116	−16.8	−14.7
255	2037046	639131	−17.0	−14.9
260	2037052	639147	−16.3	−14.2
265	2037057	639162	−16.7	−14.6
270	2037063	639177	−15.9	−13.8
275	2037069	639193	−16.8	−14.7
280	2037075	639208	−16.8	−14.7
285	2037081	639223	−16.8	−14.7
290	2037087	639239	−17.0	−14.9
295	2037092	639254	−17.0	−14.9
300	2037098	639269	−17.4	−15.3
305	2037104	639285	−17.1	−15.0
310	2037110	639300	−17.8	−15.7
315	2037116	639315	−18.3	−16.2
320	2037122	639331	−18.9	−16.8
325	2037127	639346	−18.8	−16.7
330	2037133	639361	−17.8	−15.7
335	2037139	639377	−18.0	−15.9
340	2037145	639392	−18.9	−16.8
345	2037151	639407	−19.6	−17.5
350	2037156	639423	−19.8	−17.7
355	2037162	639438	−19.8	−17.7
360	2037168	639453	−18.7	−16.6
365	2037174	639469	−20.0	−17.9
370	2037180	639484	−20.6	−18.5
375	2037186	639499	−20.1	−18.0
380	2037191	639515	−20.5	−18.4
385	2037197	639530	−19.6	−17.5
390	2037203	639545	−20.1	−18.0
395	2037209	639561	−20.6	−18.5
400	2037215	639576	−20.5	−18.4
405	2037220	639591	−19.8	−17.7
410	2037226	639607	−20.5	−18.4
415	2037232	639622	−20.8	−18.7
420	2037238	639637	−20.8	−18.7
425	2037244	639653	−20.3	−18.2
430	2037250	639668	−20.3	−18.2
435	2037255	639683	−19.5	−17.4
440	2037261	639699	−19.0	−16.9
445	2037267	639714	−19.1	−17.0
450	2037273	639729	−20.6	−18.5
455	2037279	639745	−20.0	−17.9
460	2037284	639760	−19.8	−17.7
465	2037290	639775	−20.7	−18.6
470	2037296	639791	−20.8	−18.7
475	2037302	639806	−20.3	−18.2
480	2037308	639821	−21.6	−19.5
485	2037314	639837	−21.8	−19.7
490	2037319	639852	−21.3	−19.2
495	2037325	639867	−21.1	−19.0
500	2037331	639883	−21.0	−18.9

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8830

June 23, 1995
Start/End Time: 0946/0953 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1906.007
Low Water Datum [LWD] Correction feet −2.28

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036547.956	638382.027	5.886	7.946
	2036547.755	638383.502	5.886	7.946
	2036550.105	638388.443	5.481	7.541
	2036552.816	638395.680	5.050	7.110
	2036555.130	638401.849	4.761	6.821
	2036557.249	638407.251	4.526	6.586
	2036559.199	638413.276	4.045	6.105
	2036561.119	638417.847	3.460	5.520
	2036562.914	638421.026	3.039	5.099
	2036565.409	638427.118	2.373	4.433
	2036567.871	638431.705	2.331	4.391
	2036569.544	638438.841	1.941	4.001
	2036570.893	638441.760	2.102	4.162
	2036572.109	638444.483	1.416	3.476
	2036577.688	638455.527	0.003	2.063
	2036578.674	638463.411	−0.955	1.105
	2036580.933	638469.867	−2.373	−0.313
	2036584.365	638479.747	−3.122	−1.062
	2036587.313	638485.194	−3.562	−1.502
	2036590.998	638493.899	−3.974	−1.914
	2036593.667	638504.103	−3.277	−1.217
	2036597.063	638514.712	−3.039	−0.979
	2036601.262	638525.065	−3.403	−1.343
	2036605.433	638536.993	−3.905	−1.845
	2036608.777	638546.580	−4.355	−2.295
	2036614.038	638558.611	−4.815	−2.755
	2036617.805	638564.759	−5.073	−3.013
Fathometer Data				
10	2036574	638452	−1.6	0.5
15	2036580	638467	−3.0	−0.9
20	2036586	638483	−4.0	−1.9
25	2036592	638498	−3.3	−1.2
30	2036597	638513	−3.4	−1.3
35	2036603	638529	−4.0	−1.9
40	2036609	638544	−4.6	−2.5
45	2036615	638559	−5.1	−3.0
50	2036621	638575	−5.8	−3.7
55	2036627	638590	−6.3	−4.2
60	2036632	638605	−6.6	−4.5
65	2036638	638621	−6.8	−4.7
70	2036644	638636	−7.0	−4.9
75	2036650	638651	−7.1	−5.0
80	2036656	638667	−7.1	−5.0
85	2036661	638682	−7.4	−5.3
90	2036667	638697	−7.8	−5.7
95	2036673	638713	−7.8	−5.7
100	2036679	638728	−8.0	−5.9
105	2036685	638743	−8.2	−6.1
110	2036691	638759	−8.3	−6.2
115	2036696	638774	−8.6	−6.5
120	2036702	638789	−8.8	−6.7
125	2036708	638805	−9.4	−7.3
130	2036714	638820	−9.1	−7.0
135	2036720	638835	−9.8	−7.7
140	2036725	638851	−9.8	−7.7
145	2036731	638866	−10.3	−8.2
150	2036737	638881	−10.3	−8.2
155	2036743	638897	−11.0	−8.9
160	2036749	638912	−11.6	−9.5
165	2036755	638927	−11.3	−9.2
170	2036760	638943	−11.3	−9.2

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
175	2036766	638958	−11.3	−9.2
180	2036772	638973	−11.6	−9.5
185	2036778	638989	−12.8	−10.7
190	2036784	639004	−13.6	−11.5
195	2036789	639019	−13.8	−11.7
200	2036795	639035	−14.0	−11.9
205	2036801	639050	−15.1	−13.0
210	2036807	639065	−14.3	−12.2
215	2036813	639081	−15.0	−12.9
220	2036819	639096	−15.1	−13.0
225	2036824	639111	−15.3	−13.2
230	2036830	639127	−15.4	−13.3
235	2036836	639142	−16.1	−14.0
240	2036842	639157	−16.8	−14.7
245	2036848	639173	−17.0	−14.9
250	2036853	639188	−16.8	−14.7
255	2036859	639203	−16.0	−13.9
260	2036865	639219	−15.8	−13.7
265	2036871	639234	−16.8	−14.7
270	2036877	639249	−16.0	−13.9
275	2036883	639265	−16.4	−14.3
280	2036888	639280	−17.1	−15.0
285	2036894	639295	−16.8	−14.7
290	2036900	639311	−16.2	−14.1
295	2036906	639326	−16.8	−14.7
300	2036912	639341	−16.9	−14.8
305	2036918	639357	−17.1	−15.0
310	2036923	639372	−18.8	−16.7
315	2036929	639387	−17.4	−15.3
320	2036935	639403	−16.7	−14.6
325	2036941	639418	−18.1	−16.0
330	2036947	639433	−18.4	−16.3
335	2036952	639449	−18.8	−16.7
340	2036958	639464	−19.5	−17.4
345	2036964	639479	−19.5	−17.4
350	2036970	639495	−19.8	−17.7
355	2036976	639510	−20.1	−18.0
360	2036982	639525	−20.4	−18.3
365	2036987	639541	−20.8	−18.7
370	2036993	639556	−20.8	−18.7
375	2036999	639571	−20.8	−18.7
380	2037005	639587	−20.3	−18.2
385	2037011	639602	−19.4	−17.3
390	2037016	639617	−18.8	−16.7
395	2037022	639633	−19.3	−17.2
400	2037028	639648	−20.0	−17.9
405	2037034	639663	−20.8	−18.7
410	2037040	639679	−20.8	−18.7
415	2037046	639694	−21.7	−19.6
420	2037051	639710	−20.8	−18.7
425	2037057	639725	−22.1	−20.0
430	2037063	639740	−21.2	−19.1
435	2037069	639756	−21.6	−19.5
440	2037075	639771	−21.5	−19.4
445	2037080	639786	−21.7	−19.6
450	2037086	639802	−22.3	−20.2
455	2037092	639817	−21.8	−19.7
460	2037098	639832	−21.9	−19.8
465	2037104	639848	−22.5	−20.4
470	2037110	639863	−21.9	−19.8
475	2037115	639878	−21.1	−19.0
480	2037121	639894	−21.8	−19.7
485	2037127	639909	−21.0	−18.9
490	2037133	639924	−21.0	−18.9
495	2037139	639940	−21.6	−19.5
500	2037144	639955	−21.3	−19.2

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8630

June 22, 1995
Start/End Time: 1800/1809 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1944.626
Low Water Datum [LWD] Correction feet −2.38

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036374.749	638488.976	4.216	6.276
	2036375.830	638493.395	4.496	6.556
	2036376.245	638493.601	3.110	5.170
	2036378.441	638497.900	3.230	5.290
	2036380.529	638502.575	3.226	5.286
	2036382.318	638507.745	3.312	5.372
	2036384.205	638513.164	3.310	5.370
	2036386.278	638521.250	3.089	5.149
	2036389.355	638528.184	2.683	4.743
	2036391.028	638532.713	2.420	4.480
	2036392.770	638538.156	1.912	3.972
	2036394.790	638543.711	1.737	3.797
	2036396.008	638548.049	1.746	3.806
	2036397.837	638553.849	0.839	2.899
	2036401.134	638562.015	0.050	2.110
	2036404.519	638570.478	−1.036	1.024
	2036407.477	638579.179	−3.408	−1.348
	2036409.733	638585.845	−3.882	−1.822
	2036413.663	638596.323	−4.273	−2.213
	2036416.821	638601.327	−3.817	−1.757
	2036418.681	638608.803	−3.289	−1.229
	2036422.763	638618.070	−3.275	−1.215
	2036425.400	638626.989	−3.543	−1.483
	2036427.997	638634.388	−3.849	−1.789
	2036431.479	638642.890	−4.226	−2.166
	2036432.924	638650.929	−4.594	−2.534
	2036436.207	638655.752	−4.836	−2.776
Fathometer Data				
10	2036401	638559	−2.7	−0.6
15	2036407	638574	−3.9	−1.8
20	2036413	638590	−3.7	−1.6
25	2036418	638605	−3.3	−1.2
30	2036424	638620	−3.9	−1.8
35	2036430	638636	−4.3	−2.2
40	2036436	638651	−5.2	−3.1
45	2036442	638666	−5.4	−3.3
50	2036447	638682	−5.2	−3.1
55	2036453	638697	−6.3	−4.2
60	2036459	638712	−6.9	−4.8
65	2036465	638728	−7.0	−4.9
70	2036471	638743	−7.3	−5.2
75	2036477	638758	−7.7	−5.6
80	2036482	638774	−7.8	−5.7
85	2036488	638789	−7.9	−5.8
90	2036494	638804	−8.0	−5.9
95	2036500	638820	−8.3	−6.2
100	2036506	638835	−8.6	−6.5
105	2036511	638850	−8.7	−6.6
110	2036517	638866	−8.9	−6.8
115	2036523	638881	−9.3	−7.2
120	2036529	638896	−9.5	−7.4
125	2036535	638912	−9.8	−7.7
130	2036541	638927	−10.0	−7.9
135	2036546	638942	−10.4	−8.3
140	2036552	638958	−10.9	−8.8
145	2036558	638973	−11.5	−9.4
150	2036564	638988	−10.9	−8.8
155	2036570	639004	−11.0	−8.9
160	2036575	639019	−11.7	−9.6
165	2036581	639034	−12.4	−10.3
170	2036587	639050	−13.3	−11.2

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
175	2036593	639065	−13.7	−11.6
180	2036599	639080	−14.5	−12.4
185	2036605	639096	−14.7	−12.6
190	2036610	639111	−13.7	−11.6
195	2036616	639126	−14.5	−12.4
200	2036622	639142	−14.9	−12.8
205	2036628	639157	−15.2	−13.1
210	2036634	639172	−15.1	−13.0
215	2036639	639188	−14.9	−12.8
220	2036645	639203	−15.4	−13.3
225	2036651	639218	−15.8	−13.7
230	2036657	639234	−15.7	−13.6
235	2036663	639249	−15.4	−13.3
240	2036669	639264	−15.7	−13.6
245	2036674	639280	−16.0	−13.9
250	2036680	639295	−15.2	−13.1
255	2036686	639310	−15.7	−13.6
260	2036692	639326	−16.3	−14.2
265	2036698	639341	−16.3	−14.2
270	2036703	639356	−17.9	−15.8
275	2036709	639372	−18.5	−16.4
280	2036715	639387	−17.7	−15.6
285	2036721	639402	−18.2	−16.1
290	2036727	639418	−18.0	−15.9
295	2036733	639433	−18.7	−16.6
300	2036738	639448	−18.3	−16.2
305	2036744	639464	−17.2	−15.1
310	2036750	639479	−18.3	−16.2
315	2036756	639494	−17.7	−15.6
320	2036762	639510	−18.9	−16.8
325	2036767	639525	−17.2	−15.1
330	2036773	639540	−18.3	−16.2
335	2036779	639556	−19.5	−17.4
340	2036785	639571	−19.7	−17.6
345	2036791	639587	−20.5	−18.4
350	2036797	639602	−20.5	−18.4
355	2036802	639617	−21.3	−19.2
360	2036808	639633	−20.2	−18.1
365	2036814	639648	−20.2	−18.1
370	2036820	639663	−20.8	−18.7
375	2036826	639679	−21.7	−19.6
380	2036831	639694	−21.7	−19.6
385	2036837	639709	−21.7	−19.6
390	2036843	639725	−21.7	−19.6
395	2036849	639740	−21.7	−19.6
400	2036855	639755	−21.9	−19.8
405	2036861	639771	−22.7	−20.6
410	2036866	639786	−21.7	−19.6
415	2036872	639801	−21.6	−19.5
420	2036878	639817	−22.4	−20.3
425	2036884	639832	−22.7	−20.6
430	2036890	639847	−22.2	−20.1
435	2036896	639863	−22.7	−20.6
440	2036901	639878	−21.7	−19.6
445	2036907	639893	−22.2	−20.1
450	2036913	639909	−22.8	−20.7
455	2036919	639924	−23.0	−20.9
460	2036925	639939	−22.5	−20.4
465	2036930	639955	−22.4	−20.3
470	2036936	639970	−22.7	−20.6
475	2036942	639985	−22.7	−20.6
480	2036948	640001	−23.2	−21.1
485	2036954	640016	−23.7	−21.6
490	2036960	640031	−22.7	−20.6
495	2036965	640047	−24.2	−22.1
500	2036971	640062	−22.7	−20.6

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8430

June 22, 1995
Start/End Time: 1745/1752 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2058.369
Low Water Datum [LWD] Correction feet −2.38

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036192.396	638575.272	6.904	8.964
	2036193.884	638579.671	5.718	7.778
	2036195.783	638584.352	5.354	7.414
	2036198.683	638591.405	4.986	7.046
	2036201.981	638599.605	4.469	6.529
	2036204.931	638606.092	3.843	5.903
	2036207.700	638612.549	3.248	5.308
	2036210.542	638619.570	2.724	4.784
	2036213.472	638626.044	2.441	4.501
	2036216.221	638632.697	2.335	4.395
	2036218.537	638639.249	2.356	4.416
	2036220.996	638646.241	2.345	4.405
	2036224.213	638653.499	2.071	4.131
	2036227.157	638662.055	1.904	3.964
	2036229.216	638670.035	1.551	3.611
	2036231.330	638676.600	0.935	2.995
	2036233.779	638683.864	−0.319	1.741
	2036235.434	638686.738	−2.645	−0.585
	2036236.090	638689.284	−0.416	1.644
	2036238.384	638695.366	3.284	5.344
	2036244.519	638710.325	6.355	8.415
	2036248.928	638715.346	3.323	5.383
	2036251.918	638722.759	−3.194	−1.134
Fathometer Data				
8	2036252	638730	−4.2	−2.1
10	2036254	638736	−4.7	−2.6
15	2036260	638752	−5.5	−3.4
20	2036266	638767	−4.7	−2.6
25	2036272	638782	−4.7	−2.6
30	2036278	638798	−5.5	−3.4
35	2036283	638813	−6.3	−4.2
40	2036289	638828	−6.7	−4.6
45	2036295	638844	−7.4	−5.3
50	2036301	638859	−7.7	−5.6
55	2036307	638874	−8.3	−6.2
60	2036312	638890	−8.5	−6.4
65	2036318	638905	−8.4	−6.3
70	2036324	638920	−8.9	−6.8
75	2036330	638936	−9.1	−7.0
80	2036336	638951	−9.1	−7.0
85	2036342	638966	−9.5	−7.4
90	2036347	638982	−9.9	−7.8
95	2036353	638997	−10.0	−7.9
100	2036359	639012	−10.4	−8.3
105	2036365	639028	−10.7	−8.6
110	2036371	639043	−10.8	−8.7
115	2036376	639058	−11.0	−8.9
120	2036382	639074	−11.4	−9.3
125	2036388	639089	−11.8	−9.7
130	2036394	639104	−12.6	−10.5
135	2036400	639120	−12.4	−10.3
140	2036406	639135	−12.3	−10.2
145	2036411	639150	−12.7	−10.6
150	2036417	639166	−12.5	−10.4
155	2036423	639181	−12.7	−10.6
160	2036429	639196	−13.0	−10.9
165	2036435	639212	−13.2	−11.1
170	2036440	639227	−14.2	−12.1
175	2036446	639242	−14.6	−12.5
180	2036452	639258	−14.9	−12.8
185	2036458	639273	−15.2	−13.1

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
190	2036464	639288	−15.3	−13.2
195	2036470	639304	−15.2	−13.1
200	2036475	639319	−15.5	−13.4
205	2036481	639334	−15.8	−13.7
210	2036487	639350	−15.7	−13.6
215	2036493	639365	−16.2	−14.1
220	2036499	639380	−15.7	−13.6
225	2036504	639396	−16.2	−14.1
230	2036510	639411	−15.7	−13.6
235	2036516	639426	−16.4	−14.3
240	2036522	639442	−16.4	−14.3
245	2036528	639457	−16.7	−14.6
250	2036534	639472	−16.0	−13.9
255	2036539	639488	−16.7	−14.6
260	2036545	639503	−17.9	−15.8
265	2036551	639518	−17.2	−15.1
270	2036557	639534	−18.4	−16.3
275	2036563	639549	−18.9	−16.8
280	2036568	639564	−19.2	−17.1
285	2036574	639580	−18.2	−16.1
290	2036580	639595	−19.0	−16.9
295	2036586	639610	−19.4	−17.3
300	2036592	639626	−19.9	−17.8
305	2036598	639641	−20.3	−18.2
310	2036603	639656	−20.5	−18.4
315	2036609	639672	−21.3	−19.2
320	2036615	639687	−21.8	−19.7
325	2036621	639702	−21.3	−19.2
330	2036627	639718	−19.5	−17.4
335	2036632	639733	−20.8	−18.7
340	2036638	639748	−20.6	−18.5
345	2036644	639764	−21.7	−19.6
350	2036650	639779	−20.4	−18.3
355	2036656	639794	−20.4	−18.3
360	2036662	639810	−19.6	−17.5
365	2036667	639825	−20.2	−18.1
370	2036673	639840	−21.0	−18.9
375	2036679	639856	−21.8	−19.7
380	2036685	639871	−20.8	−18.7
385	2036691	639886	−20.7	−18.6
390	2036696	639902	−21.3	−19.2
395	2036702	639917	−20.4	−18.3
400	2036708	639933	−22.5	−20.4
405	2036714	639948	−22.2	−20.1
410	2036720	639963	−22.7	−20.6
415	2036726	639979	−23.5	−21.4
420	2036731	639994	−22.7	−20.6
425	2036737	640009	−23.4	−21.3
430	2036743	640025	−23.4	−21.3
435	2036749	640040	−23.2	−21.1
440	2036755	640055	−22.7	−20.6
445	2036761	640071	−23.0	−20.9
450	2036766	640086	−22.7	−20.6
455	2036772	640101	−22.9	−20.8
460	2036778	640117	−23.0	−20.9
465	2036784	640132	−22.7	−20.6
470	2036790	640147	−22.7	−20.6
475	2036795	640163	−23.7	−21.6
480	2036801	640178	−23.4	−21.3
485	2036807	640193	−23.0	−20.9
490	2036813	640209	−23.0	−20.9
495	2036819	640224	−23.4	−21.3
500	2036825	640239	−23.4	−21.3

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8300

June 22, 1995
Start/End Time: 1728/1736 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.28

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036072.991	638625.370	5.560	7.620
	2036074.212	638628.082	6.175	8.235
	2036076.353	638633.563	5.766	7.826
	2036076.243	638633.743	5.547	7.607
	2036079.818	638644.393	4.902	6.962
	2036081.467	638648.627	3.967	6.027
	2036085.160	638660.303	3.268	5.328
	2036089.213	638670.917	2.950	5.010
	2036092.818	638681.994	2.716	4.776
	2036095.880	638691.055	2.347	4.407
	2036096.870	638696.582	2.034	4.094
	2036097.935	638703.041	1.752	3.812
	2036099.857	638705.675	1.648	3.708
	2036102.355	638712.606	0.554	2.614
	2036104.823	638720.315	−0.465	1.595
	2036110.015	638724.780	−1.016	1.044
	2036113.955	638734.839	−1.555	0.505
	2036117.183	638743.176	−2.133	−0.073
	2036120.528	638751.642	−2.641	−0.581
	2036123.912	638760.463	−3.167	−1.107
	2036127.198	638770.397	−3.626	−1.566
	2036131.068	638778.523	−4.215	−2.155
	2036132.730	638785.468	−4.643	−2.583
	2036134.451	638792.587	−4.620	−2.560
	2036138.461	638798.371	−4.566	−2.506
	2036141.958	638807.574	−4.184	−2.124
	2036146.164	638819.617	−4.116	−2.056
	2036150.795	638828.816	−4.109	−2.049
	2036154.283	638839.341	−4.207	−2.147
	2036157.952	638850.577	−4.474	−2.414
	2036163.495	638866.711	−4.966	−2.906
Fathometer Data				
10	2036112	638728	−2.0	0.1
15	2036118	638743	−3.1	−1.0
20	2036124	638758	−3.7	−1.6
25	2036129	638774	−4.6	−2.5
30	2036135	638789	−4.3	−2.2
35	2036141	638804	−4.3	−2.2
40	2036147	638820	−4.0	−1.9
45	2036153	638835	−4.3	−2.2
50	2036159	638850	−4.7	−2.6
55	2036164	638866	−5.4	−3.3
60	2036170	638881	−5.0	−2.9
65	2036176	638896	−6.5	−4.4
70	2036182	638912	−7.1	−5.0
75	2036188	638927	−7.6	−5.5
80	2036193	638942	−7.9	−5.8
85	2036199	638958	−8.4	−6.3
90	2036205	638973	−8.6	−6.5
95	2036211	638988	−9.0	−6.9
100	2036217	639004	−9.2	−7.1
105	2036223	639019	−9.6	−7.5
110	2036228	639034	−9.9	−7.8
115	2036234	639050	−10.0	−7.9
120	2036240	639065	−10.5	−8.4
125	2036246	639081	−10.7	−8.6
130	2036252	639096	−11.1	−9.0
135	2036257	639111	−11.5	−9.4
140	2036263	639127	−11.9	−9.8
145	2036269	639142	−12.3	−10.2
150	2036275	639157	−12.8	−10.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
155	2036281	639173	−12.8	−10.7
160	2036287	639188	−13.0	−10.9
165	2036292	639203	−12.8	−10.7
170	2036298	639219	−12.8	−10.7
175	2036304	639234	−12.5	−10.4
180	2036310	639249	−12.7	−10.6
185	2036316	639265	−12.6	−10.5
190	2036321	639280	−13.0	−10.9
195	2036327	639295	−14.0	−11.9
200	2036333	639311	−14.8	−12.7
205	2036339	639326	−14.6	−12.5
210	2036345	639341	−15.1	−13.0
215	2036351	639357	−15.5	−13.4
220	2036356	639372	−16.1	−14.0
225	2036362	639387	−16.0	−13.9
230	2036368	639403	−16.6	−14.5
235	2036374	639418	−16.3	−14.2
240	2036380	639433	−16.8	−14.7
245	2036385	639449	−17.8	−15.7
250	2036391	639464	−17.8	−15.7
255	2036397	639479	−17.3	−15.2
260	2036403	639495	−17.1	−15.0
265	2036409	639510	−18.5	−16.4
270	2036415	639525	−18.8	−16.7
275	2036420	639541	−18.8	−16.7
280	2036426	639556	−18.8	−16.7
285	2036432	639571	−18.8	−16.7
290	2036438	639587	−18.7	−16.6
295	2036444	639602	−20.1	−18.0
300	2036449	639617	−20.7	−18.6
305	2036455	639633	−20.5	−18.4
310	2036461	639648	−19.3	−17.2
315	2036467	639663	−19.3	−17.2
320	2036473	639679	−20.5	−18.4
325	2036479	639694	−20.3	−18.2
330	2036484	639709	−21.4	−19.3
335	2036490	639725	−22.0	−19.9
340	2036496	639740	−20.4	−18.3
345	2036502	639755	−21.8	−19.7
350	2036508	639771	−21.8	−19.7
355	2036514	639786	−21.5	−19.4
360	2036519	639801	−20.3	−18.2
365	2036525	639817	−20.8	−18.7
370	2036531	639832	−20.0	−17.9
375	2036537	639847	−21.1	−19.0
380	2036543	639863	−21.4	−19.3
385	2036548	639878	−22.1	−20.0
390	2036554	639893	−22.1	−20.0
395	2036560	639909	−22.3	−20.2
400	2036566	639924	−21.5	−19.4
405	2036572	639939	−22.0	−19.9
410	2036578	639955	−22.6	−20.5
415	2036583	639970	−23.5	−21.4
420	2036589	639985	−22.8	−20.7
425	2036595	640001	−21.8	−19.7
430	2036601	640016	−21.8	−19.7
435	2036607	640031	−22.8	−20.7
440	2036612	640047	−22.8	−20.7
445	2036618	640062	−22.6	−20.5
450	2036624	640077	−22.8	−20.7
455	2036630	640093	−23.5	−21.4
460	2036636	640108	−22.8	−20.7
465	2036642	640123	−22.8	−20.7
470	2036647	640139	−22.8	−20.7
475	2036653	640154	−23.4	−21.3
480	2036659	640169	−22.5	−20.4
485	2036665	640185	−23.6	−21.5
490	2036671	640200	−23.0	−20.9
495	2036676	640215	−22.8	−20.7
500	2036682	640231	−24.0	−21.9

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8230

June 22, 1995
Start/End Time: 1714/1721 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.23

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2036008.063	638651.006	7.331	9.391
	2036009.201	638653.832	7.852	9.912
	2036010.841	638657.874	7.457	9.517
	2036010.819	638658.952	7.277	9.337
	2036013.586	638664.466	7.023	9.083
	2036016.663	638673.331	6.459	8.519
	2036020.005	638681.860	5.645	7.705
	2036022.999	638689.738	4.838	6.898
	2036025.726	638697.750	4.063	6.123
	2036028.153	638704.622	3.563	5.623
	2036030.977	638712.498	2.739	4.799
	2036034.001	638720.463	1.914	3.974
	2036034.676	638722.188	1.809	3.869
	2036041.186	638736.908	−0.029	2.031
	2036042.044	638741.195	−0.677	1.383
	2036043.856	638744.901	−1.397	0.663
	2036047.906	638756.766	−1.984	0.076
	2036051.960	638766.725	−2.489	−0.429
	2036055.274	638776.421	−2.920	−0.860
	2036058.886	638784.795	−3.205	−1.145
	2036065.344	638802.450	−3.572	−1.512
	2036068.960	638811.548	−3.707	−1.647
	2036072.106	638820.765	−3.783	−1.723
	2036075.536	638831.290	−3.997	−1.937
	2036079.119	638839.453	−4.137	−2.077
	2036082.747	638848.364	−4.233	−2.173
	2036086.895	638857.840	−4.442	−2.382
	2036090.481	638869.307	−4.727	−2.667
	2036094.478	638880.734	−4.899	−2.839
	2036095.576	638889.320	−5.153	−3.093
Fathometer Data				
20	2036058	638783	−3.5	−1.5
25	2036064	638799	−3.8	−1.8
30	2036070	638814	−3.8	−1.8
35	2036076	638829	−4.1	−2.1
40	2036081	638845	−4.6	−2.6
45	2036087	638860	−4.8	−2.8
50	2036093	638875	−5.1	−3.1
55	2036099	638891	−5.5	−3.5
60	2036105	638906	−5.7	−3.7
65	2036111	638921	−6.1	−4.1
70	2036116	638937	−6.3	−4.3
75	2036122	638952	−6.8	−4.8
80	2036128	638967	−7.5	−5.5
85	2036134	638983	−7.8	−5.8
90	2036140	638998	−8.6	−6.6
95	2036145	639013	−8.7	−6.7
100	2036151	639029	−8.9	−6.9
105	2036157	639044	−9.5	−7.5
110	2036163	639059	−9.7	−7.7
115	2036169	639075	−10.0	−8.0
120	2036175	639090	−10.6	−8.6
125	2036180	639105	−10.7	−8.7
130	2036186	639121	−11.0	−9.0
135	2036192	639136	−11.1	−9.1
140	2036198	639151	−11.7	−9.7
145	2036204	639167	−11.8	−9.8
150	2036209	639182	−12.3	−10.3
155	2036215	639197	−12.3	−10.3
160	2036221	639213	−12.3	−10.3
165	2036227	639228	−12.8	−10.8
170	2036233	639243	−12.3	−10.3
175	2036239	639259	−12.7	−10.7
180	2036244	639274	−13.0	−11.0
185	2036250	639289	−13.9	−11.9
190	2036256	639305	−13.8	−11.8
195	2036262	639320	−15.0	−13.0
200	2036268	639335	−15.0	−13.0
205	2036273	639351	−15.0	−13.0
210	2036279	639366	−15.8	−13.8
215	2036285	639381	−15.5	−13.5
220	2036291	639397	−16.4	−14.4
225	2036297	639412	−16.4	−14.4
230	2036303	639427	−15.9	−13.9
235	2036308	639443	−17.0	−15.0
240	2036314	639458	−17.4	−15.4
245	2036320	639473	−16.6	−14.6
250	2036326	639489	−17.5	−15.5
255	2036332	639504	−17.3	−15.3
260	2036337	639519	−16.8	−14.8
265	2036343	639535	−17.6	−15.6
270	2036349	639550	−18.8	−16.8
275	2036355	639565	−18.8	−16.8
280	2036361	639581	−18.1	−16.1
285	2036367	639596	−18.2	−16.2
290	2036372	639611	−19.1	−17.1
295	2036378	639627	−19.9	−17.9
300	2036384	639642	−20.6	−18.6
305	2036390	639657	−19.8	−17.8
310	2036396	639673	−20.3	−18.3
315	2036402	639688	−20.6	−18.6
320	2036407	639703	−20.6	−18.6
325	2036413	639719	−19.2	−17.2
330	2036419	639734	−20.1	−18.1
335	2036425	639750	−20.5	−18.5
340	2036431	639765	−20.2	−18.2
345	2036436	639780	−20.3	−18.3
350	2036442	639796	−21.6	−19.6
355	2036448	639811	−21.6	−19.6
360	2036454	639826	−20.6	−18.6
365	2036460	639842	−21.0	−19.0
370	2036466	639857	−21.1	−19.1
375	2036471	639872	−21.5	−19.5
380	2036477	639888	−21.7	−19.7
385	2036483	639903	−21.6	−19.6
390	2036489	639918	−22.5	−20.5
395	2036495	639934	−22.8	−20.8
400	2036500	639949	−22.3	−20.3
405	2036506	639964	−22.7	−20.7
410	2036512	639980	−23.5	−21.5
415	2036518	639995	−23.6	−21.6
420	2036524	640010	−23.8	−21.8
425	2036530	640026	−22.6	−20.6
430	2036535	640041	−22.8	−20.8
435	2036541	640056	−22.0	−20.0
440	2036547	640072	−22.5	−20.5
445	2036553	640087	−22.6	−20.6
450	2036559	640102	−22.8	−20.8
455	2036564	640118	−23.0	−21.0
460	2036570	640133	−22.8	−20.8
465	2036576	640148	−22.7	−20.7
470	2036582	640164	−21.0	−19.0
475	2036588	640179	−21.5	−19.5
480	2036594	640194	−22.3	−20.3
485	2036599	640210	−22.5	−20.5
490	2036605	640225	−22.6	−20.6
495	2036611	640240	−22.8	−20.8
500	2036617	640256	−23.5	−21.5

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8200

June 22, 1995
Start/End Time: 1658/1706 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.18

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035981.177	638665.435	5.365	7.425
	2035982.204	638673.033	9.266	11.326
	2035986.684	638680.002	8.480	10.540
	2035990.344	638686.875	7.812	9.872
	2035993.161	638695.809	7.253	9.313
	2035996.388	638704.055	6.372	8.432
	2035996.010	638704.407	5.437	7.497
	2035999.401	638713.156	4.332	6.392
	2036002.631	638721.046	3.445	5.505
	2036005.492	638729.215	2.476	4.536
	2036008.910	638738.780	1.624	3.684
	2036014.859	638753.156	0.082	2.142
	2036016.593	638758.337	−0.753	1.307
	2036018.653	638762.311	−1.450	0.610
	2036022.541	638774.063	−1.980	0.080
	2036026.529	638783.817	−2.436	−0.376
	2036030.768	638794.872	−2.813	−0.753
	2036035.277	638803.496	−3.261	−1.201
	2036038.748	638816.061	−3.426	−1.366
	2036042.677	638827.042	−3.612	−1.552
	2036046.547	638837.810	−3.890	−1.830
	2036052.062	638849.458	−4.117	−2.057
	2036056.402	638860.897	−4.568	−2.508
	2036058.939	638871.771	−4.908	−2.848
	2036064.707	638880.442	−5.060	−3.000
	2036064.403	638887.289	−5.413	−3.353
Fathometer Data				
20	2036030	638794	−3.1	−1.0
25	2036036	638809	−3.5	−1.4
30	2036042	638825	−4.0	−1.9
35	2036048	638840	−4.3	−2.2
40	2036053	638855	−4.9	−2.8
45	2036059	638871	−5.4	−3.3
50	2036065	638886	−5.9	−3.8
55	2036071	638901	−6.0	−3.9
60	2036077	638917	−6.1	−4.0
65	2036082	638932	−6.3	−4.2
70	2036088	638947	−6.5	−4.4
75	2036094	638963	−6.9	−4.8
80	2036100	638978	−7.4	−5.3
85	2036106	638993	−8.1	−6.0
90	2036112	639009	−8.6	−6.5
95	2036117	639024	−8.8	−6.7
100	2036123	639039	−9.1	−7.0
105	2036129	639055	−9.7	−7.6
110	2036135	639070	−9.8	−7.7
115	2036141	639085	−10.2	−8.1
120	2036147	639101	−10.4	−8.3
125	2036152	639116	−10.7	−8.6
130	2036158	639131	−10.9	−8.8
135	2036164	639147	−11.3	−9.2
140	2036170	639162	−11.7	−9.6
145	2036176	639177	−11.9	−9.8
150	2036181	639193	−12.2	−10.1
155	2036187	639208	−12.9	−10.8
160	2036193	639223	−12.6	−10.5
165	2036199	639239	−12.1	−10.0
170	2036205	639254	−12.9	−10.8
175	2036211	639269	−13.7	−11.6
180	2036216	639285	−14.3	−12.2
185	2036222	639300	−14.1	−12.0
190	2036228	639315	−14.7	−12.6
195	2036234	639331	−15.4	−13.3
200	2036240	639346	−14.9	−12.8
205	2036245	639361	−14.5	−12.4
210	2036251	639377	−15.7	−13.6
215	2036257	639392	−15.7	−13.6
220	2036263	639407	−16.4	−14.3
225	2036269	639423	−16.8	−14.7
230	2036275	639438	−17.9	−15.8
235	2036280	639453	−17.6	−15.5
240	2036286	639469	−17.1	−15.0
245	2036292	639484	−17.7	−15.6
250	2036298	639499	−17.3	−15.2
255	2036304	639515	−16.9	−14.8
260	2036309	639530	−18.1	−16.0
265	2036315	639545	−18.2	−16.1
270	2036321	639561	−18.2	−16.1
275	2036327	639576	−18.3	−16.2
280	2036333	639591	−19.4	−17.3
285	2036339	639607	−19.1	−17.0
290	2036344	639622	−20.0	−17.9
295	2036350	639637	−19.0	−16.9
300	2036356	639653	−19.2	−17.1
305	2036362	639668	−19.9	−17.8
310	2036368	639683	−19.9	−17.8
315	2036373	639699	−19.9	−17.8
320	2036379	639714	−20.2	−18.1
325	2036385	639729	−20.9	−18.8
330	2036391	639745	−19.1	−17.0
335	2036397	639760	−19.7	−17.6
340	2036403	639775	−19.9	−17.8
345	2036408	639791	−20.8	−18.7
350	2036414	639806	−21.2	−19.1
355	2036420	639821	−19.9	−17.8
360	2036426	639837	−20.1	−18.0
365	2036432	639852	−20.9	−18.8
370	2036437	639868	−21.6	−19.5
375	2036443	639883	−21.7	−19.6
380	2036449	639898	−22.0	−19.9
385	2036455	639914	−21.5	−19.4
390	2036461	639929	−22.7	−20.6
395	2036467	639944	−22.9	−20.8
400	2036472	639960	−22.7	−20.6
405	2036478	639975	−22.4	−20.3
410	2036484	639990	−23.4	−21.3
415	2036490	640006	−23.5	−21.4
420	2036496	640021	−22.9	−20.8
425	2036501	640036	−21.9	−19.8
430	2036507	640052	−22.1	−20.0
435	2036513	640067	−22.1	−20.0
440	2036519	640082	−22.5	−20.4
445	2036525	640098	−22.9	−20.8
450	2036531	640113	−21.8	−19.7
455	2036536	640128	−22.2	−20.1
460	2036542	640144	−22.9	−20.8
465	2036548	640159	−23.6	−21.5
470	2036554	640174	−22.6	−20.5
475	2036560	640190	−22.9	−20.8
480	2036565	640205	−22.7	−20.6
485	2036571	640220	−22.9	−20.8
490	2036577	640236	−22.9	−20.8
495	2036583	640251	−22.8	−20.7
500	2036589	640266	−23.3	−21.2

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N8030

June 22, 1995
Start/End Time: 1635/1647 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2238.420
Low Water Datum [LWD] Correction feet −2.25

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035816.282	638709.505	10.092	12.152
	2035816.465	638710.195	9.585	11.645
	2035837.519	638765.051	8.409	10.469
	2035861.471	638829.150	7.147	9.207
	2035861.523	638829.511	6.632	8.692
	2035865.602	638839.418	5.778	7.838
	2035868.514	638847.915	5.283	7.343
	2035873.147	638855.957	4.552	6.612
	2035876.828	638863.538	4.022	6.082
	2035878.986	638873.197	3.604	5.664
	2035881.457	638883.119	3.162	5.222
	2035885.948	638892.634	2.701	4.761
	2035889.356	638901.884	2.454	4.514
	2035892.722	638911.369	2.270	4.330
	2035896.333	638921.207	1.964	4.024
	2035899.423	638930.089	1.713	3.773
	2035902.706	638938.987	1.629	3.689
	2035906.320	638948.235	1.593	3.653
	2035909.609	638956.414	1.356	3.416
	2035913.304	638965.158	0.800	2.860
	2035915.918	638970.812	0.220	2.280
	2035917.033	638973.778	−0.153	1.907
	2035917.927	638975.069	−0.543	1.517
	2035920.849	638982.159	−0.961	1.099
	2035923.530	638989.174	−1.005	1.055
	2035925.229	638994.680	−1.483	0.577
	2035926.360	638997.815	−2.195	−0.135
	2035927.669	638998.493	3.028	5.088
	2035929.505	639004.089	6.135	8.195
	2035932.678	639015.687	7.707	9.767
	2035938.036	639028.577	4.326	6.386
	2035940.709	639032.852	2.584	4.644
	2035941.572	639036.845	−5.997	−3.937
Fathometer Data				
7	2035941	639037	−5.5	−3.4
10	2035944	639046	−5.9	−3.8
15	2035950	639062	−6.5	−4.4
20	2035956	639077	−6.9	−4.8
25	2035962	639092	−7.2	−5.1
30	2035967	639108	−7.9	−5.8
35	2035973	639123	−8.6	−6.5
40	2035979	639138	−8.8	−6.7
45	2035985	639154	−9.6	−7.5
50	2035991	639169	−9.8	−7.7
55	2035996	639184	−10.2	−8.1
60	2036002	639200	−10.8	−8.7
65	2036008	639215	−11.5	−9.4
70	2036014	639230	−11.8	−9.7
75	2036020	639246	−12.8	−10.7
80	2036026	639261	−13.0	−10.9
85	2036031	639276	−12.8	−10.7
90	2036037	639292	−12.6	−10.5
95	2036043	639307	−12.8	−10.7
100	2036049	639323	−13.1	−11.0
105	2036055	639338	−14.0	−11.9
110	2036060	639353	−14.0	−11.9
115	2036066	639369	−14.8	−12.7
120	2036072	639384	−14.7	−12.6
125	2036078	639399	−14.9	−12.8
130	2036084	639415	−15.0	−12.9
135	2036090	639430	−15.8	−13.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
140	2036095	639445	−15.8	−13.7
145	2036101	639461	−16.5	−14.4
150	2036107	639476	−15.8	−13.7
155	2036113	639491	−16.8	−14.7
160	2036119	639507	−17.0	−14.9
165	2036125	639522	−17.7	−15.6
170	2036130	639537	−17.8	−15.7
175	2036136	639553	−18.3	−16.2
180	2036142	639568	−17.7	−15.6
185	2036148	639583	−16.8	−14.7
190	2036154	639599	−16.9	−14.8
195	2036159	639614	−15.8	−13.7
200	2036165	639629	−16.7	−14.6
205	2036171	639645	−17.9	−15.8
210	2036177	639660	−17.8	−15.7
215	2036183	639675	−18.4	−16.3
220	2036189	639691	−18.8	−16.7
225	2036194	639706	−19.8	−17.7
230	2036200	639721	−20.0	−17.9
235	2036206	639737	−20.6	−18.5
240	2036212	639752	−19.9	−17.8
245	2036218	639767	−20.8	−18.7
250	2036223	639783	−19.3	−17.2
255	2036229	639798	−20.0	−17.9
260	2036235	639813	−20.2	−18.1
265	2036241	639829	−21.3	−19.2
270	2036247	639844	−19.8	−17.7
275	2036253	639859	−20.7	−18.6
280	2036258	639875	−20.9	−18.8
285	2036264	639890	−21.8	−19.7
290	2036270	639905	−21.8	−19.7
295	2036276	639921	−21.7	−19.6
300	2036282	639936	−22.3	−20.2
305	2036287	639951	−22.1	−20.0
310	2036293	639967	−21.1	−19.0
315	2036299	639982	−21.4	−19.3
320	2036305	639997	−21.7	−19.6
325	2036311	640013	−22.1	−20.0
330	2036317	640028	−22.3	−20.2
335	2036322	640043	−23.2	−21.1
340	2036328	640059	−21.6	−19.5
345	2036334	640074	−22.8	−20.7
350	2036340	640089	−22.0	−19.9
355	2036346	640105	−22.3	−20.2
360	2036351	640120	−22.0	−19.9
365	2036357	640135	−22.6	−20.5
370	2036363	640151	−23.0	−20.9
375	2036369	640166	−22.6	−20.5
380	2036375	640181	−23.0	−20.9
385	2036381	640197	−22.6	−20.5
390	2036386	640212	−23.3	−21.2
395	2036392	640227	−22.6	−20.5
400	2036398	640243	−23.2	−21.1
405	2036404	640258	−22.0	−19.9
410	2036410	640273	−21.8	−19.7
415	2036415	640289	−22.6	−20.5
420	2036421	640304	−22.1	−20.0
425	2036427	640319	−22.3	−20.2
430	2036433	640335	−22.9	−20.8
435	2036439	640350	−22.4	−20.3
440	2036445	640365	−22.8	−20.7
445	2036450	640381	−22.4	−20.3
450	2036456	640396	−21.8	−19.7
455	2036462	640411	−22.8	−20.7
460	2036468	640427	−22.2	−20.1
465	2036474	640442	−21.5	−19.4
470	2036479	640457	−21.6	−19.5
475	2036485	640473	−21.8	−19.7
480	2036491	640488	−22.0	−19.9
485	2036497	640503	−21.9	−19.8
490	2036503	640519	−21.8	−19.7
495	2036509	640534	−22.7	−20.6
500	2036514	640549	−22.5	−20.4

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7850

June 23, 1995
Start/End Time: 1502/1507 CST

MiniRanger (Mr) Easting:
Lake Forest Coordinates [LFC] feet 2100.000
Low Water Datum [LWD] Correction feet −2.24

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035651.183	638781.916	4.758	6.818
	2035672.458	638836.815	7.813	9.873
	2035680.486	638857.988	6.932	8.992
	2035680.299	638858.445	6.335	8.395
	2035682.616	638864.794	6.011	8.071
	2035684.826	638870.776	5.743	7.803
	2035687.017	638875.677	5.743	7.803
	2035688.092	638878.776	5.265	7.325
	2035689.828	638883.789	4.927	6.987
	2035690.289	638884.896	4.674	6.734
	2035693.273	638892.874	4.197	6.257
	2035696.778	638900.958	3.763	5.823
	2035699.173	638908.974	3.283	5.343
	2035700.900	638917.342	2.952	5.012
	2035705.360	638926.102	2.689	4.749
	2035709.314	638934.529	2.270	4.330
	2035711.387	638941.072	1.884	3.944
	2035713.491	638947.963	1.518	3.578
	2035718.247	638961.211	−0.069	1.991
	2035719.886	638963.365	−0.518	1.542
	2035721.282	638966.143	−1.338	0.722
	2035723.938	638972.893	−1.696	0.364
	2035725.776	638978.688	−1.464	0.596
	2035727.657	638985.262	−1.673	0.387
	2035731.866	638994.612	−2.420	−0.360
	2035734.864	639002.400	−2.902	−0.842
	2035738.184	639011.423	−3.405	−1.345
	2035742.028	639019.610	−3.674	−1.614
	2035745.506	639029.550	−4.046	−1.986
	2035748.986	639039.820	−4.382	−2.322
	2035753.289	639049.067	−4.620	−2.560
	2035756.156	639057.852	−4.888	−2.828
	2035760.175	639073.126	−5.332	−3.272
	2035765.271	639081.951	−5.380	−3.320
	2035768.788	639089.264	−5.493	−3.433

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
10	2035727	638981	−2.4	−0.4
15	2035733	638996	−3.3	−1.3
20	2035738	639012	−3.8	−1.8
25	2035744	639027	−4.3	−2.3
30	2035750	639042	−4.7	−2.7
35	2035756	639058	−5.0	−3.0
40	2035762	639073	−5.2	−3.2
45	2035767	639088	−5.3	−3.3
50	2035773	639104	−5.7	−3.7
55	2035779	639119	−6.3	−4.3
60	2035785	639134	−6.6	−4.6
65	2035791	639150	−7.3	−5.3
70	2035797	639165	−7.8	−5.8
75	2035802	639180	−8.0	−6.0
80	2035808	639196	−8.7	−6.7
85	2035814	639211	−8.9	−6.9
90	2035820	639226	−9.6	−7.6
95	2035826	639242	−9.9	−7.9
100	2035831	639257	−10.0	−8.0
105	2035837	639272	−10.8	−8.8
110	2035843	639288	−10.8	−8.8
115	2035849	639303	−11.3	−9.3
120	2035855	639318	−11.9	−9.9
125	2035861	639334	−12.8	−10.8
130	2035866	639349	−13.0	−11.0
135	2035872	639364	−13.4	−11.4
140	2035878	639380	−12.8	−10.8
145	2035884	639395	−12.9	−10.9
150	2035890	639410	−12.7	−10.7
155	2035895	639426	−12.9	−10.9
160	2035901	639441	−13.0	−11.0
165	2035907	639456	−13.1	−11.1
170	2035913	639472	−13.8	−11.8
175	2035919	639487	−13.9	−11.9
180	2035925	639502	−14.0	−12.0
185	2035930	639518	−14.5	−12.5
190	2035936	639533	−14.8	−12.8
195	2035942	639548	−15.5	−13.5
200	2035948	639564	−15.8	−13.8
205	2035954	639579	−16.7	−14.7
210	2035959	639594	−17.5	−15.5
215	2035965	639610	−17.0	−15.0
220	2035971	639625	−17.4	−15.4
225	2035977	639640	−17.8	−15.8
230	2035983	639656	−17.6	−15.6
235	2035989	639671	−17.8	−15.8
240	2035994	639686	−18.3	−16.3
245	2036000	639702	−18.9	−16.9
250	2036006	639717	−18.5	−16.5
255	2036012	639732	−17.3	−15.3
260	2036018	639748	−17.6	−15.6
265	2036024	639763	−19.1	−17.1
270	2036029	639778	−19.7	−17.7
275	2036035	639794	−20.1	−18.1
280	2036041	639809	−20.4	−18.4
285	2036047	639824	−20.5	−18.5
290	2036053	639840	−20.1	−18.1
295	2036058	639855	−21.0	−19.0
300	2036064	639870	−20.8	−18.8
305	2036070	639886	−21.3	−19.3
310	2036076	639901	−20.0	−18.0
315	2036082	639916	−20.8	−18.8
320	2036088	639932	−20.5	−18.5
325	2036093	639947	−20.9	−18.9
330	2036099	639962	−20.7	−18.7
335	2036105	639978	−20.3	−18.3
340	2036111	639993	−20.4	−18.4
345	2036117	640008	−21.8	−19.8
350	2036122	640024	−21.9	−19.9
355	2036128	640039	−20.8	−18.8
360	2036134	640054	−21.5	−19.5
365	2036140	640070	−21.8	−19.8
370	2036146	640085	−21.4	−19.4
375	2036152	640101	−22.1	−20.1
380	2036157	640116	−21.3	−19.3
385	2036163	640131	−22.1	−20.1
390	2036169	640147	−21.9	−19.9
395	2036175	640162	−22.1	−20.1
400	2036181	640177	−22.8	−20.8
405	2036186	640193	−22.0	−20.0
410	2036192	640208	−22.1	−20.1
415	2036198	640223	−23.0	−21.0
420	2036204	640239	−23.7	−21.7
425	2036210	640254	−23.1	−21.1
430	2036216	640269	−23.0	−21.0
435	2036221	640285	−22.9	−20.9
440	2036227	640300	−22.1	−20.1
445	2036233	640315	−22.8	−20.8
450	2036239	640331	−23.0	−21.0
455	2036245	640346	−22.5	−20.5
460	2036250	640361	−22.8	−20.8
465	2036256	640377	−23.3	−21.3
470	2036262	640392	−22.9	−20.9
475	2036268	640407	−23.7	−21.7
480	2036274	640423	−22.8	−20.8
485	2036280	640438	−23.0	−21.0
490	2036285	640453	−22.8	−20.8
495	2036291	640469	−20.8	−18.8
500	2036297	640484	−21.8	−19.8

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7750

June 23, 1995
Start/End Time: 1640/1647 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2110.000
Low Water Datum [LWD] Correction feet −2.21

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035558.096	638818.609	6.893	8.953
	2035567.861	638846.962	8.978	11.038
	2035580.142	638877.196	8.152	10.212
	2035585.003	638891.447	7.809	9.869
	2035589.380	638901.750	6.629	8.689
	2035589.879	638901.690	6.430	8.490
	2035590.065	638902.600	6.843	8.903
	2035590.144	638902.593	6.843	8.903
	2035590.371	638903.762	5.736	7.796
	2035594.223	638912.262	5.275	7.335
	2035595.853	638917.596	5.011	7.071
	2035599.145	638925.100	4.601	6.661
	2035601.984	638932.468	4.288	6.348
	2035604.477	638939.589	3.926	5.986
	2035607.916	638948.168	3.630	5.690
	2035611.017	638956.451	3.251	5.311
	2035614.995	638963.774	2.843	4.903
	2035617.047	638973.362	2.571	4.631
	2035620.087	638981.703	1.990	4.050
	2035626.175	638996.861	0.299	2.359
	2035627.910	639005.373	−0.631	1.429
	2035629.139	639011.094	−1.874	0.186
	2035631.861	639019.370	−2.872	−0.812
	2035635.747	639026.107	−2.301	−0.241
	2035639.535	639035.031	−2.512	−0.452
	2035643.813	639048.107	−3.067	−1.007
	2035648.484	639054.129	−3.425	−1.365
	2035650.836	639064.790	−3.927	−1.867
	2035655.034	639076.108	−4.304	−2.244
	2035659.173	639086.677	−4.665	−2.605
	2035662.207	639094.872	−5.059	−2.999
	2035663.230	639099.030	−5.296	−3.236
Fathometer Data				
5	2035631	639010	−3.0	−1.0
10	2035637	639026	−2.6	−0.6
15	2035643	639041	−3.1	−1.1
20	2035648	639056	−3.8	−1.8
25	2035654	639072	−4.5	−2.5
30	2035660	639087	−5.1	−3.1
35	2035666	639102	−5.7	−3.7
40	2035672	639118	−6.0	−4.0
45	2035678	639133	−6.6	−4.6
50	2035683	639148	−6.8	−4.8
55	2035689	639164	−7.6	−5.6
60	2035695	639179	−8.4	−6.4
65	2035701	639194	−8.7	−6.7
70	2035707	639210	−8.9	−6.9
75	2035712	639225	−9.1	−7.1
80	2035718	639240	−9.6	−7.6
85	2035724	639256	−9.8	−7.8
90	2035730	639271	−10.2	−8.2
95	2035736	639286	−10.4	−8.4
100	2035742	639302	−10.3	−8.3
105	2035747	639317	−10.8	−8.8
110	2035753	639332	−11.0	−9.0
115	2035759	639348	−11.5	−9.5
120	2035765	639363	−11.6	−9.6
125	2035771	639378	−12.8	−10.8
130	2035776	639394	−13.3	−11.3
135	2035782	639409	−13.5	−11.5
140	2035788	639424	−12.8	−10.8

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
145	2035794	639440	−12.4	−10.4
150	2035800	639455	−12.7	−10.7
155	2035806	639470	−12.8	−10.8
160	2035811	639486	−12.9	−10.9
165	2035817	639501	−13.0	−11.0
170	2035823	639516	−13.1	−11.1
175	2035829	639532	−13.4	−11.4
180	2035835	639547	−13.8	−11.8
185	2035840	639563	−14.1	−12.1
190	2035846	639578	−14.6	−12.6
195	2035852	639593	−15.0	−13.0
200	2035858	639609	−15.5	−13.5
205	2035864	639624	−16.1	−14.1
210	2035870	639639	−16.8	−14.8
215	2035875	639655	−17.3	−15.3
220	2035881	639670	−17.6	−15.6
225	2035887	639685	−16.8	−14.8
230	2035893	639701	−15.5	−13.5
235	2035899	639716	−16.4	−14.4
240	2035904	639731	−17.2	−15.2
245	2035910	639747	−17.9	−15.9
250	2035916	639762	−18.8	−16.8
255	2035922	639777	−18.5	−16.5
260	2035928	639793	−19.2	−17.2
265	2035934	639808	−18.3	−16.3
270	2035939	639823	−18.5	−16.5
275	2035945	639839	−19.0	−17.0
280	2035951	639854	−19.8	−17.8
285	2035957	639869	−19.8	−17.8
290	2035963	639885	−20.0	−18.0
295	2035968	639900	−19.9	−17.9
300	2035974	639915	−19.5	−17.5
305	2035980	639931	−20.0	−18.0
310	2035986	639946	−19.8	−17.8
315	2035992	639961	−19.6	−17.6
320	2035998	639977	−20.0	−18.0
325	2036003	639992	−18.8	−16.8
330	2036009	640007	−19.3	−17.3
335	2036015	640023	−20.8	−18.8
340	2036021	640038	−20.8	−18.8
345	2036027	640053	−21.3	−19.3
350	2036032	640069	−20.1	−18.1
355	2036038	640084	−21.1	−19.1
360	2036044	640099	−21.5	−19.5
365	2036050	640115	−21.3	−19.3
370	2036056	640130	−21.8	−19.8
375	2036062	640145	−21.0	−19.0
380	2036067	640161	−21.9	−19.9
385	2036073	640176	−21.8	−19.8
390	2036079	640191	−22.5	−20.5
395	2036085	640207	−22.1	−20.1
400	2036091	640222	−22.3	−20.3
405	2036096	640237	−22.7	−20.7
410	2036102	640253	−22.4	−20.4
415	2036108	640268	−22.9	−20.9
420	2036114	640283	−22.8	−20.8
425	2036120	640299	−23.3	−21.3
430	2036126	640314	−21.8	−19.8
435	2036131	640329	−21.8	−19.8
440	2036137	640345	−22.5	−20.5
445	2036143	640360	−22.0	−20.0
450	2036149	640375	−21.9	−19.9
455	2036155	640391	−21.8	−19.8
460	2036161	640406	−21.9	−19.9
465	2036166	640421	−22.0	−20.0
470	2036172	640437	−22.8	−20.8
475	2036178	640452	−22.0	−20.0
480	2036184	640467	−22.1	−20.1
485	2036190	640483	−21.6	−19.6
490	2036195	640498	−20.9	−18.9
495	2036201	640513	−20.9	−18.9
500	2036207	640529	−21.5	−19.5

1995 FOREST PARK BEACH BATHYMETRIC DATA

Illinois State Geological Survey

LINE N7450

June 23, 1995
Start/End Time: 1618/1627 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2100.000
Low Water Datum [LWD] Correction feet −2.22

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035301.066	638985.013	6.356	8.416
	2035302.947	638991.572	3.933	5.993
	2035305.305	638996.548	6.618	8.678
	2035304.983	638996.803	6.475	8.535
	2035304.710	638996.996	6.309	8.369
	2035307.122	639003.672	5.999	8.059
	2035309.273	639009.761	5.809	7.869
	2035311.656	639016.092	5.428	7.488
	2035314.391	639023.210	5.048	7.108
	2035317.121	639027.611	4.669	6.729
	2035318.952	639032.675	4.337	6.397
	2035318.863	639033.748	3.837	5.897
	2035321.107	639039.203	3.410	5.470
	2035324.000	639046.593	3.007	5.067
	2035326.363	639053.114	2.674	4.734
	2035329.734	639061.487	2.437	4.497
	2035332.895	639069.993	2.128	4.188
	2035335.633	639076.778	1.819	3.879
	2035338.302	639083.463	1.510	3.570
	2035340.738	639088.622	1.131	3.191
	2035342.781	639096.358	0.364	2.424
	2035346.803	639102.387	−1.194	0.866
	2035347.958	639107.105	−0.456	1.604
	2035356.743	639123.182	−1.743	0.317
	2035356.799	639131.030	−1.378	0.682
	2035361.347	639141.004	−1.307	0.753
	2035365.834	639152.944	−1.647	0.413
	2035370.068	639164.221	−2.132	−0.072
	2035374.871	639175.070	−2.351	−0.291
	2035379.231	639188.688	−3.061	−1.001
	2035383.074	639198.731	−3.383	−1.323
	2035387.170	639209.784	−3.925	−1.865
	2035392.567	639220.754	−4.390	−2.330
	2035396.331	639231.121	−5.251	−3.191
	2035397.038	639233.840	−5.476	−3.416
Fathometer Data				
20	2035364	639153	−2.0	0.0
25	2035370	639169	−2.9	−0.9
30	2035376	639184	−3.3	−1.3
35	2035382	639199	−3.9	−1.9
40	2035388	639215	−4.5	−2.5
45	2035393	639230	−5.3	−3.3
50	2035399	639245	−5.8	−3.8
55	2035405	639261	−7.0	−5.0
60	2035411	639276	−7.1	−5.1
65	2035417	639291	−7.1	−5.1
70	2035423	639307	−7.4	−5.4
75	2035428	639322	−7.4	−5.4
80	2035434	639337	−9.5	−7.5
85	2035440	639353	−9.5	−7.5
90	2035446	639368	−9.8	−7.8
95	2035452	639384	−9.8	−7.8
100	2035457	639399	−10.4	−8.4
105	2035463	639414	−10.9	−8.9
110	2035469	639430	−11.0	−9.0
115	2035475	639445	−11.8	−9.8
120	2035481	639460	−11.9	−9.9
125	2035487	639476	−12.7	−10.7
130	2035492	639491	−12.1	−10.1
135	2035498	639506	−12.4	−10.4
140	2035504	639522	−12.3	−10.3

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
145	2035510	639537	−13.1	−11.1
150	2035516	639552	−12.8	−10.8
155	2035521	639568	−14.6	−12.6
160	2035527	639583	−13.9	−11.9
165	2035533	639598	−14.6	−12.6
170	2035539	639614	−15.4	−13.4
175	2035545	639629	−15.9	−13.9
180	2035551	639644	−15.8	−13.8
185	2035556	639660	−15.3	−13.3
190	2035562	639675	−15.8	−13.8
195	2035568	639690	−15.8	−13.8
200	2035574	639706	−15.5	−13.5
205	2035580	639721	−15.3	−13.3
210	2035586	639736	−16.0	−14.0
215	2035591	639752	−16.5	−14.5
220	2035597	639767	−16.6	−14.6
225	2035603	639782	−16.8	−14.8
230	2035609	639798	−17.7	−15.7
235	2035615	639813	−18.0	−16.0
240	2035620	639828	−17.8	−15.8
245	2035626	639844	−17.8	−15.8
250	2035632	639859	−18.1	−16.1
255	2035638	639874	−17.1	−15.1
260	2035644	639890	−18.1	−16.1
265	2035650	639905	−18.1	−16.1
270	2035655	639920	−18.8	−16.8
275	2035661	639936	−18.5	−16.5
280	2035667	639951	−19.0	−17.0
285	2035673	639966	−19.5	−17.5
290	2035679	639982	−18.8	−16.8
295	2035684	639997	−19.0	−17.0
300	2035690	640012	−19.3	−17.3
305	2035696	640028	−19.8	−17.8
310	2035702	640043	−19.6	−17.6
315	2035708	640058	−20.0	−18.0
320	2035714	640074	−19.0	−17.0
325	2035719	640089	−20.4	−18.4
330	2035725	640104	−20.3	−18.3
335	2035731	640120	−19.3	−17.3
340	2035737	640135	−20.1	−18.1
345	2035743	640150	−20.6	−18.6
350	2035748	640166	−20.6	−18.6
355	2035754	640181	−19.9	−17.9
360	2035760	640196	−20.5	−18.5
365	2035766	640212	−20.1	−18.1
370	2035772	640227	−18.7	−16.7
375	2035778	640242	−18.0	−16.0
380	2035783	640258	−19.5	−17.5
385	2035789	640273	−19.5	−17.5
390	2035795	640288	−19.8	−17.8
395	2035801	640304	−20.0	−18.0
400	2035807	640319	−19.6	−17.6
405	2035812	640334	−19.8	−17.8
410	2035818	640350	−19.9	−17.9
415	2035824	640365	−20.0	−18.0
420	2035830	640380	−19.7	−17.7
425	2035836	640396	−20.0	−18.0
430	2035842	640411	−20.6	−18.6
435	2035847	640426	−20.5	−18.5
440	2035853	640442	−20.1	−18.1
445	2035859	640457	−20.0	−18.0
450	2035865	640472	−19.8	−17.8
455	2035871	640488	−19.8	−17.8
460	2035876	640503	−19.8	−17.8
465	2035882	640518	−19.0	−17.0
470	2035888	640534	−19.8	−17.8
475	2035894	640549	−20.0	−18.0
480	2035900	640564	−19.8	−17.8
485	2035906	640580	−20.8	−18.8
490	2035911	640595	−21.8	−19.8
495	2035917	640610	−20.8	−18.8
500	2035923	640626	−20.8	−18.8

1995 FOREST PARK BEACH BATHYMETRIC DATA

Illinois State Geological Survey

LINE N7350

June 24, 1995
Start/End Time: 0752/0758 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.20

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035197.023	639002.827	6.575	8.635
	2035200.125	639006.107	4.262	6.322
	2035202.928	639010.657	4.258	6.318
	2035203.674	639011.629	6.376	8.436
	2035203.444	639011.749	6.245	8.305
	2035205.588	639017.852	6.796	8.856
	2035208.544	639025.451	5.273	7.333
	2035212.390	639032.796	4.829	6.889
	2035212.212	639033.175	4.459	6.519
	2035211.435	639034.233	4.312	6.372
	2035214.069	639041.320	3.961	6.021
	2035215.626	639047.574	3.647	5.707
	2035219.111	639054.258	3.358	5.418
	2035222.091	639062.461	2.991	5.051
	2035224.341	639068.531	2.729	4.789
	2035227.366	639076.352	2.493	4.553
	2035230.235	639084.258	2.021	4.081
	2035231.925	639089.137	1.733	3.793
	2035234.316	639095.404	1.366	3.426
	2035235.809	639100.560	1.418	3.478
	2035239.895	639110.642	0.006	2.066
	2035241.508	639116.072	−1.125	0.935
	2035244.412	639124.552	−1.549	0.511
	2035246.837	639129.823	−1.416	0.644
	2035251.864	639138.220	−1.355	0.705
	2035259.871	639161.483	−2.605	−0.545
	2035260.719	639169.592	−2.932	−0.872
	2035265.967	639182.144	−3.699	−1.639
	2035269.044	639193.035	−4.081	−2.021
	2035277.904	639207.851	−4.443	−2.383
	2035282.399	639224.991	−4.867	−2.807
	2035286.344	639233.604	−4.978	−2.918
	2035288.096	639238.447	−5.116	−3.056
Fathometer Data				
35	2035253	639141	−2.4	−0.3
40	2035259	639157	−3.1	−1.0
45	2035264	639172	−3.9	−1.8
50	2035270	639187	−4.4	−2.3
55	2035276	639203	−4.7	−2.6
60	2035282	639218	−4.9	−2.8
65	2035288	639233	−5.4	−3.3
70	2035294	639249	−5.6	−3.5
75	2035299	639264	−6.2	−4.1
80	2035305	639279	−6.5	−4.4
85	2035311	639295	−6.6	−4.5
90	2035317	639310	−7.2	−5.1
95	2035323	639325	−7.7	−5.6
100	2035329	639341	−7.9	−5.8
105	2035334	639356	−8.6	−6.5
110	2035340	639371	−8.9	−6.8
115	2035346	639387	−9.0	−6.9
120	2035352	639402	−9.2	−7.1
125	2035358	639418	−9.9	−7.8
130	2035363	639433	−9.9	−7.8
135	2035369	639448	−10.2	−8.1
140	2035375	639464	−10.5	−8.4
145	2035381	639479	−10.8	−8.7
150	2035387	639494	−11.1	−9.0
155	2035393	639510	−11.6	−9.5
160	2035398	639525	−11.5	−9.4
165	2035404	639540	−11.9	−9.8

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
170	2035410	639556	−11.9	−9.8
175	2035416	639571	−12.5	−10.4
180	2035422	639586	−12.6	−10.5
185	2035427	639602	−12.4	−10.3
190	2035433	639617	−12.4	−10.3
195	2035439	639632	−12.6	−10.5
200	2035445	639648	−12.1	−10.0
205	2035451	639663	−12.1	−10.0
210	2035457	639678	−12.3	−10.2
215	2035462	639694	−12.9	−10.8
220	2035468	639709	−12.9	−10.8
225	2035474	639724	−13.9	−11.8
230	2035480	639740	−14.9	−12.8
235	2035486	639755	−16.1	−14.0
240	2035491	639770	−16.0	−13.9
245	2035497	639786	−17.0	−14.9
250	2035503	639801	−16.9	−14.8
255	2035509	639816	−16.7	−14.6
260	2035515	639832	−17.7	−15.6
265	2035521	639847	−17.0	−14.9
270	2035526	639862	−17.9	−15.8
275	2035532	639878	−17.2	−15.1
280	2035538	639893	−17.9	−15.8
285	2035544	639908	−17.9	−15.8
290	2035550	639924	−17.9	−15.8
295	2035555	639939	−17.3	−15.2
300	2035561	639954	−17.2	−15.1
305	2035567	639970	−17.2	−15.1
310	2035573	639985	−18.5	−16.4
315	2035579	640000	−19.6	−17.5
320	2035585	640016	−19.0	−16.9
325	2035590	640031	−18.6	−16.5
330	2035596	640046	−18.4	−16.3
335	2035602	640062	−18.6	−16.5
340	2035608	640077	−19.0	−16.9
345	2035614	640092	−20.0	−17.9
350	2035619	640108	−21.0	−18.9
355	2035625	640123	−19.7	−17.6
360	2035631	640138	−19.1	−17.0
365	2035637	640154	−20.4	−18.3
370	2035643	640169	−21.2	−19.1
375	2035649	640184	−19.9	−17.8
380	2035654	640200	−20.9	−18.8
385	2035660	640215	−21.0	−18.9
390	2035666	640230	−19.2	−17.1
395	2035672	640246	−19.9	−17.8
400	2035678	640261	−19.7	−17.6
405	2035683	640276	−19.9	−17.8
410	2035689	640292	−20.0	−17.9
415	2035695	640307	−20.9	−18.8
420	2035701	640322	−20.9	−18.8
425	2035707	640338	−20.9	−18.8
430	2035713	640353	−19.9	−17.8
435	2035718	640368	−19.9	−17.8
440	2035724	640384	−19.1	−17.0
445	2035730	640399	−19.0	−16.9
450	2035736	640414	−18.4	−16.3
455	2035742	640430	−18.9	−16.8
460	2035747	640445	−18.5	−16.4
465	2035753	640460	−19.9	−17.8
470	2035759	640476	−19.4	−17.3
475	2035765	640491	−19.4	−17.3
480	2035771	640506	−19.9	−17.8
485	2035777	640522	−19.7	−17.6
490	2035782	640537	−19.9	−17.8
495	2035788	640552	−20.5	−18.4
500	2035794	640568	−20.1	−18.0
	2035800	640583	−19.7	−17.6

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N7000

June 23, 1995
Start/End Time: 1037/1045 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.30

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034844.267	639052.257	6.944	9.004
	2034846.265	639058.397	6.661	8.721
	2034848.463	639063.713	6.502	8.562
	2034848.615	639063.943	6.358	8.418
	2034848.767	639064.775	6.930	8.990
	2034849.124	639064.795	6.930	8.990
	2034849.365	639064.929	5.353	7.413
	2034851.376	639070.428	5.234	7.294
	2034853.755	639079.764	5.396	7.456
	2034856.634	639085.998	5.269	7.329
	2034858.051	639089.319	5.358	7.418
	2034861.169	639097.082	5.244	7.304
	2034864.004	639105.040	5.444	7.504
	2034867.797	639114.209	5.291	7.351
	2034871.262	639123.944	4.858	6.918
	2034875.892	639133.860	4.002	6.062
	2034879.123	639143.826	3.515	5.575
	2034882.917	639153.555	2.948	5.008
	2034884.600	639158.820	2.855	4.915
	2034888.186	639168.887	2.953	5.013
	2034892.595	639179.144	3.231	5.291
	2034895.798	639186.617	2.715	4.775
	2034897.488	639192.132	1.891	3.951
	2034899.021	639200.616	1.017	3.077
	2034903.422	639207.492	0.286	2.346
	2034906.084	639216.874	−1.290	0.770
	2034909.709	639224.634	−2.173	−0.113
	2034913.495	639233.128	−2.296	−0.236
	2034917.271	639244.736	−2.094	−0.034
	2034920.907	639252.788	−2.419	−0.359
	2034924.628	639264.085	−2.788	−0.728
	2034928.474	639273.711	−3.212	−1.152
	2034933.227	639285.291	−3.720	−1.660
	2034937.155	639297.769	−4.282	−2.222
	2034941.523	639307.227	−4.773	−2.713
	2034942.999	639314.006	−5.200	−3.140
Fathometer Data				
20	2034908	639220	−2.6	−0.5
25	2034914	639235	−2.6	−0.5
30	2034920	639250	−2.9	−0.8
35	2034926	639266	−3.6	−1.5
40	2034931	639281	−4.3	−2.2
45	2034937	639296	−4.8	−2.7
50	2034943	639312	−5.8	−3.7
55	2034949	639327	−6.5	−4.4
60	2034955	639342	−7.5	−5.4
65	2034961	639358	−7.6	−5.5
70	2034966	639373	−7.8	−5.7
75	2034972	639388	−8.0	−5.9
80	2034978	639404	−8.8	−6.7
85	2034984	639419	−9.3	−7.2
90	2034990	639434	−9.6	−7.5
95	2034995	639450	−9.7	−7.6
100	2035001	639465	−9.6	−7.5
105	2035007	639480	−10.0	−7.9
110	2035013	639496	−10.0	−7.9
115	2035019	639511	−10.6	−8.5
120	2035025	639526	−10.5	−8.4
125	2035030	639542	−10.6	−8.5
130	2035036	639557	−10.7	−8.6
135	2035042	639572	−10.7	−8.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
140	2035048	639588	−10.8	−8.7
145	2035054	639603	−10.9	−8.8
150	2035059	639618	−11.0	−8.9
155	2035065	639634	−11.1	−9.0
160	2035071	639649	−11.6	−9.5
165	2035077	639664	−11.6	−9.5
170	2035083	639680	−11.7	−9.6
175	2035089	639695	−12.0	−9.9
180	2035094	639710	−12.3	−10.2
185	2035100	639726	−12.6	−10.5
190	2035106	639741	−12.8	−10.7
195	2035112	639756	−13.3	−11.2
200	2035118	639772	−13.5	−11.4
205	2035123	639787	−14.0	−11.9
210	2035129	639802	−14.6	−12.5
215	2035135	639818	−14.9	−12.8
220	2035141	639833	−15.8	−13.7
225	2035147	639848	−16.7	−14.6
230	2035153	639864	−16.8	−14.7
235	2035158	639879	−17.7	−15.6
240	2035164	639894	−17.6	−15.5
245	2035170	639910	−16.9	−14.8
250	2035176	639925	−16.8	−14.7
255	2035182	639940	−18.1	−16.0
260	2035187	639956	−18.0	−15.9
265	2035193	639971	−17.8	−15.7
270	2035199	639986	−17.3	−15.2
275	2035205	640002	−17.8	−15.7
280	2035211	640017	−17.6	−15.5
285	2035217	640032	−17.9	−15.8
290	2035222	640048	−18.6	−16.5
295	2035228	640063	−18.4	−16.3
300	2035234	640078	−18.0	−15.9
305	2035240	640094	−18.4	−16.3
310	2035246	640109	−17.8	−15.7
315	2035251	640124	−18.3	−16.2
320	2035257	640140	−18.5	−16.4
325	2035263	640155	−18.8	−16.7
330	2035269	640171	−18.9	−16.8
335	2035275	640186	−19.3	−17.2
340	2035281	640201	−19.7	−17.6
345	2035286	640217	−19.7	−17.6
350	2035292	640232	−20.6	−18.5
355	2035298	640247	−20.0	−17.9
360	2035304	640263	−19.7	−17.6
365	2035310	640278	−19.3	−17.2
370	2035316	640293	−18.8	−16.7
375	2035321	640309	−19.3	−17.2
380	2035327	640324	−19.9	−17.8
385	2035333	640339	−20.4	−18.3
390	2035339	640355	−20.2	−18.1
395	2035345	640370	−18.8	−16.7
400	2035350	640385	−19.8	−17.7
405	2035356	640401	−20.0	−17.9
410	2035362	640416	−20.4	−18.3
415	2035368	640431	−19.7	−17.6
420	2035374	640447	−20.6	−18.5
425	2035380	640462	−20.7	−18.6
430	2035385	640477	−20.7	−18.6
435	2035391	640493	−20.6	−18.5
440	2035397	640508	−20.8	−18.7
445	2035403	640523	−20.8	−18.7
450	2035409	640539	−21.5	−19.4
455	2035414	640554	−21.6	−19.5
460	2035420	640569	−21.0	−18.9
465	2035426	640585	−21.0	−18.9
470	2035432	640600	−21.2	−19.1
475	2035438	640615	−21.5	−19.4
480	2035444	640631	−21.8	−19.7
485	2035449	640646	−21.0	−18.9
490	2035455	640661	−20.6	−18.5
495	2035461	640677	−20.0	−17.9
500	2035467	640692	−21.0	−18.9

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6900

June 23, 1995
Start/End Time: 1100/1106 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.000
Low Water Datum [LWD] Correction feet −2.32

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034743.959	639068.265	7.003	9.063
	2034745.999	639074.501	6.714	8.774
	2034747.539	639078.766	6.515	8.575
	2034747.856	639078.925	6.412	8.472
	2034748.101	639079.614	6.978	9.038
	2034748.033	639079.708	6.979	9.039
	2034748.111	639079.961	5.055	7.115
	2034751.185	639088.953	4.612	6.672
	2034753.952	639097.909	4.651	6.711
	2034757.385	639106.091	4.742	6.802
	2034761.308	639115.289	4.696	6.756
	2034764.948	639124.499	4.676	6.736
	2034768.601	639133.369	4.376	6.436
	2034772.072	639142.826	4.011	6.071
	2034776.430	639152.935	3.538	5.598
	2034780.215	639162.146	3.243	5.303
	2034783.181	639172.235	2.704	4.764
	2034786.680	639181.436	3.044	5.104
	2034789.892	639189.626	3.420	5.480
	2034793.217	639197.960	3.259	5.319
	2034796.142	639207.207	2.163	4.223
	2034797.354	639210.342	1.853	3.913
	2034800.708	639219.568	1.252	3.312
	2034802.842	639226.139	0.262	2.322
	2034806.229	639234.852	−1.400	0.660
	2034811.043	639247.939	−3.208	−1.148
	2034815.376	639258.402	−3.231	−1.171
	2034818.902	639268.591	−3.501	−1.441
	2034823.563	639279.014	−3.913	−1.853
	2034828.777	639292.515	−4.337	−2.277
	2034831.577	639303.122	−4.635	−2.575
	2034834.115	639311.451	−4.829	−2.769
	2034839.634	639321.479	−5.192	−3.132
Fathometer Data				
15	2034809	639240	−3.4	−1.4
20	2034815	639255	−3.5	−1.5
25	2034820	639270	−3.9	−1.9
30	2034826	639286	−4.5	−2.5
35	2034832	639301	−5.0	−3.0
40	2034838	639316	−5.5	−3.5
45	2034844	639332	−5.7	−3.7
50	2034850	639347	−6.3	−4.3
55	2034855	639362	−6.6	−4.6
60	2034861	639378	−6.9	−4.9
65	2034867	639393	−7.5	−5.5
70	2034873	639408	−8.2	−6.2
75	2034879	639424	−8.6	−6.6
80	2034884	639439	−9.0	−7.0
85	2034890	639454	−9.3	−7.3
90	2034896	639470	−9.9	−7.9
95	2034902	639485	−10.4	−8.4
100	2034908	639500	−10.7	−8.7
105	2034914	639516	−10.9	−8.9
110	2034919	639531	−11.6	−9.6
115	2034925	639546	−12.7	−10.7
120	2034931	639562	−11.9	−9.9
125	2034937	639577	−12.0	−10.0
130	2034943	639592	−12.1	−10.1
135	2034949	639608	−11.9	−9.9
140	2034954	639623	−11.9	−9.9
145	2034960	639638	−11.6	−9.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
150	2034966	639654	−11.8	−9.8
155	2034972	639669	−11.7	−9.7
160	2034978	639685	−11.7	−9.7
165	2034983	639700	−11.9	−9.9
170	2034989	639715	−11.9	−9.9
175	2034995	639731	−12.0	−10.0
180	2035001	639746	−12.4	−10.4
185	2035007	639761	−12.7	−10.7
190	2035013	639777	−12.9	−10.9
195	2035018	639792	−13.4	−11.4
200	2035024	639807	−13.7	−11.7
205	2035030	639823	−13.9	−11.9
210	2035036	639838	−14.2	−12.2
215	2035042	639853	−14.7	−12.7
220	2035047	639869	−14.9	−12.9
225	2035053	639884	−15.7	−13.7
230	2035059	639899	−16.2	−14.2
235	2035065	639915	−16.0	−14.0
240	2035071	639930	−15.7	−13.7
245	2035077	639945	−16.7	−14.7
250	2035082	639961	−15.8	−13.8
255	2035088	639976	−16.4	−14.4
260	2035094	639991	−16.0	−14.0
265	2035100	640007	−16.9	−14.9
270	2035106	640022	−15.7	−13.7
275	2035111	640037	−16.9	−14.9
280	2035117	640053	−15.9	−13.9
285	2035123	640068	−17.7	−15.7
290	2035129	640083	−17.0	−15.0
295	2035135	640099	−18.7	−16.7
300	2035141	640114	−18.7	−16.7
305	2035146	640129	−17.2	−15.2
310	2035152	640145	−18.2	−16.2
315	2035158	640160	−19.2	−17.2
320	2035164	640175	−19.0	−17.0
325	2035170	640191	−19.3	−17.3
330	2035175	640206	−18.9	−16.9
335	2035181	640221	−19.3	−17.3
340	2035187	640237	−18.9	−16.9
345	2035193	640252	−19.6	−17.6
350	2035199	640267	−19.7	−17.7
355	2035205	640283	−19.7	−17.7
360	2035210	640298	−20.0	−18.0
365	2035216	640313	−19.6	−17.6
370	2035222	640329	−19.6	−17.6
375	2035228	640344	−19.5	−17.5
380	2035234	640359	−19.5	−17.5
385	2035239	640375	−19.6	−17.6
390	2035245	640390	−19.8	−17.8
395	2035251	640405	−20.0	−18.0
400	2035257	640421	−19.7	−17.7
405	2035263	640436	−19.7	−17.7
410	2035269	640451	−19.5	−17.5
415	2035274	640467	−20.5	−18.5
420	2035280	640482	−19.6	−17.6
425	2035286	640497	−19.6	−17.6
430	2035292	640513	−19.4	−17.4
435	2035298	640528	−20.5	−18.5
440	2035303	640543	−20.5	−18.5
445	2035309	640559	−21.0	−19.0
450	2035315	640574	−19.9	−17.9
455	2035321	640589	−20.9	−18.9
460	2035327	640605	−20.9	−18.9
465	2035333	640620	−21.7	−19.7
470	2035338	640635	−21.7	−19.7
475	2035344	640651	−21.7	−19.7
480	2035350	640666	−20.7	−18.7
485	2035356	640681	−19.7	−17.7
490	2035362	640697	−20.8	−18.8
495	2035367	640712	−20.7	−18.7
500	2035373	640727	−20.9	−18.9

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6700

June 23, 1995
Start/End Time: 1214/1220 CST

MiniRanger (MR) Easting:
Lake Forest Coordinate [LFC] feet 2181.216
Low Water Datum [LWD] Correction feet −2.35

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034579.777	639199.493	6.883	8.943
	2034581.945	639205.892	6.590	8.650
	2034584.373	639211.763	6.402	8.462
	2034584.252	639212.088	6.289	8.349
	2034584.485	639212.561	6.883	8.943
	2034584.822	639212.601	6.883	8.943
	2034584.923	639213.166	5.165	7.225
	2034587.530	639220.377	4.619	6.679
	2034590.285	639227.093	4.593	6.653
	2034593.235	639234.893	4.450	6.510
	2034597.152	639243.210	4.165	6.225
	2034600.113	639252.210	3.860	5.920
	2034602.761	639260.441	3.500	5.560
	2034606.163	639268.834	3.025	5.085
	2034609.287	639278.651	2.712	4.772
	2034612.875	639287.286	2.401	4.461
	2034616.865	639297.846	1.996	4.056
	2034620.977	639308.293	1.834	3.894
	2034624.431	639316.680	1.969	4.029
	2034628.054	639326.207	2.015	4.075
	2034631.620	639335.538	2.006	4.066
	2034635.580	639345.136	2.035	4.095
	2034638.530	639354.831	1.927	3.987
	2034641.837	639365.058	1.786	3.846
	2034645.086	639374.734	1.586	3.646
	2034649.025	639384.042	1.331	3.391
	2034652.759	639394.204	1.194	3.254
	2034655.278	639402.515	1.027	3.087
	2034657.727	639407.231	0.455	2.515
	2034657.631	639408.939	2.947	5.007
	2034657.765	639411.482	3.721	5.781
	2034661.806	639415.630	7.984	10.044
	2034665.493	639424.083	9.176	11.236
	2034665.744	639424.416	6.667	8.727
	2034668.114	639432.756	6.853	8.913
	2034668.208	639433.029	8.410	10.470
	2034668.875	639434.018	8.410	10.470
	2034669.190	639434.869	9.597	11.657
	2034671.995	639443.350	7.611	9.671
	2034676.210	639449.195	3.021	5.081
	2034677.805	639452.739	−1.864	0.196
	2034679.730	639457.740	−3.286	−1.226
	2034682.607	639461.662	−4.300	−2.240
	2034684.397	639467.154	−5.769	−3.709
Fathometer Data				
10	2034680	639465	−7.3	−5.2
15	2034686	639480	−7.7	−5.6
20	2034692	639495	−8.2	−6.1
25	2034698	639511	−9.1	−7.0
30	2034704	639526	−9.6	−7.5
35	2034709	639541	−9.9	−7.8
40	2034715	639557	−10.7	−8.6
45	2034721	639572	−10.0	−7.9
50	2034727	639587	−11.7	−9.6
55	2034733	639603	−11.8	−9.7
60	2034739	639618	−11.9	−9.8
65	2034744	639633	−12.7	−10.6
70	2034750	639649	−12.6	−10.5
75	2034756	639664	−12.0	−9.9
80	2034762	639679	−12.4	−10.3
85	2034768	639695	−12.0	−9.9
90	2034773	639710	−11.9	−9.8
95	2034779	639726	−12.2	−10.1
100	2034785	639741	−12.3	−10.2
105	2034791	639756	−12.4	−10.3
110	2034797	639772	−12.4	−10.3
115	2034803	639787	−12.5	−10.4
120	2034808	639802	−12.8	−10.7
125	2034814	639818	−12.9	−10.8
130	2034820	639833	−12.9	−10.8
135	2034826	639848	−13.2	−11.1
140	2034832	639864	−13.3	−11.2
145	2034837	639879	−13.7	−11.6
150	2034843	639894	−13.8	−11.7
155	2034849	639910	−14.2	−12.1
160	2034855	639925	−14.5	−12.4
165	2034861	639940	−14.7	−12.6
170	2034867	639956	−14.9	−12.8
175	2034872	639971	−16.3	−14.2
180	2034878	639986	−15.5	−13.4
185	2034884	640002	−16.9	−14.8
190	2034890	640017	−17.0	−14.9
195	2034896	640032	−16.9	−14.8
200	2034901	640048	−16.7	−14.6
205	2034907	640063	−17.2	−15.1
210	2034913	640078	−17.7	−15.6
215	2034919	640094	−17.9	−15.8
220	2034925	640109	−17.7	−15.6
225	2034931	640124	−18.8	−16.7
230	2034936	640140	−18.0	−15.9
235	2034942	640155	−17.7	−15.6
240	2034948	640170	−17.7	−15.6
245	2034954	640186	−18.3	−16.2
250	2034960	640201	−17.7	−15.6
255	2034965	640216	−18.1	−16.0
260	2034971	640232	−17.8	−15.7
265	2034977	640247	−18.8	−16.7
270	2034983	640262	−19.0	−16.9
275	2034989	640278	−19.5	−17.4
280	2034995	640293	−18.7	−16.6
285	2035000	640308	−18.5	−16.4
290	2035006	640324	−18.9	−16.8
295	2035012	640339	−18.7	−16.6
300	2035018	640354	−18.5	−16.4
305	2035024	640370	−17.4	−15.3
310	2035029	640385	−17.6	−15.5
315	2035035	640400	−18.5	−16.4
320	2035041	640416	−18.7	−16.6
325	2035047	640431	−18.8	−16.7
330	2035053	640446	−18.7	−16.6
335	2035059	640462	−19.2	−17.1
340	2035064	640477	−19.7	−17.6
345	2035070	640492	−20.4	−18.3
350	2035076	640508	−20.2	−18.1
355	2035082	640523	−21.2	−19.1
360	2035088	640538	−20.9	−18.8
365	2035093	640554	−20.7	−18.6
370	2035099	640569	−20.7	−18.6
375	2035105	640584	−21.5	−19.4
380	2035111	640600	−21.7	−19.6
385	2035117	640615	−21.7	−19.6
390	2035123	640630	−20.7	−18.6
395	2035128	640646	−20.8	−18.7
400	2035134	640661	−21.6	−19.5
405	2035140	640676	−20.6	−18.5
410	2035146	640692	−20.9	−18.8
415	2035152	640707	−20.9	−18.8
420	2035158	640722	−21.0	−18.9
425	2035163	640738	−21.5	−19.4
430	2035169	640753	−21.2	−19.1
435	2035175	640768	−21.5	−19.4
440	2035181	640784	−21.8	−19.7
445	2035187	640799	−20.7	−18.6
450	2035192	640814	−19.9	−17.8

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6417

June 23, 1995
Start/End Time: 1231/1238 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2228.407
Low Water Datum [LWD] Correction feet −2.38

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034324.547	639326.027	5.833	7.893
	2034334.734	639346.701	5.979	8.039
	2034335.046	639346.624	5.434	7.494
	2034335.229	639347.528	5.979	8.039
	2034335.049	639348.255	−6.074	−4.014
	2034340.296	639357.759	−6.803	−4.743
	2034342.325	639362.544	−6.979	−4.919
	2034344.458	639367.668	−7.191	−5.131
	2034347.236	639374.250	−7.613	−5.553
	2034349.769	639380.712	−7.466	−5.406
	2034352.825	639387.474	−6.760	−4.700
	2034355.482	639393.852	−6.499	−4.439
	2034359.168	639402.561	−6.889	−4.829
	2034362.826	639411.531	−7.230	−5.170
	2034366.739	639420.784	−7.263	−5.203
	2034368.231	639424.330	−6.501	−4.441
	2034369.899	639428.587	−5.747	−3.687
	2034371.018	639431.456	−5.515	−3.455
	2034372.672	639438.300	−6.128	−4.068
	2034375.549	639444.988	−5.335	−3.275
	2034378.629	639454.616	−7.049	−4.989
	2034381.885	639464.858	−6.636	−4.576
	2034384.456	639472.355	−6.273	−4.213
	2034388.758	639480.914	−6.651	−4.591
	2034391.054	639489.984	−6.367	−4.307
	2034394.010	639498.765	−6.359	−4.299
	2034396.707	639506.165	−6.877	−4.817
	2034399.713	639513.537	−7.033	−4.973
	2034400.855	639517.974	−5.686	−3.626
	2034404.045	639525.671	−5.598	−3.538
	2034407.024	639532.857	−3.286	−1.226
	2034409.516	639539.539	−2.140	−0.080
	2034411.824	639545.931	−2.378	−0.318
	2034412.622	639547.960	0.728	2.788
	2034414.194	639551.542	3.812	5.872
	2034416.864	639557.834	5.770	7.830
	2034419.358	639567.393	10.095	12.155
	2034423.189	639577.580	8.928	10.988
	2034424.276	639580.169	9.186	11.246
	2034425.597	639584.163	6.864	8.924
	2034425.834	639587.851	4.163	6.223
	2034427.635	639591.421	1.244	3.304
	2034428.874	639593.678	−2.430	−0.370
Fathometer Data				
10	2034432	639609	−8.4	−6.3
15	2034438	639625	−9.7	−7.6
20	2034444	639640	−10.6	−8.5
25	2034450	639655	−10.7	−8.6
30	2034456	639671	−10.9	−8.8
35	2034462	639686	−11.1	−9.0
40	2034467	639701	−11.5	−9.4
45	2034473	639717	−11.6	−9.5
50	2034479	639732	−12.2	−10.1
55	2034485	639747	−12.9	−10.8
60	2034491	639763	−13.2	−11.1
65	2034496	639778	−12.9	−10.8
70	2034502	639793	−13.3	−11.2
75	2034508	639809	−12.8	−10.7
80	2034514	639824	−13.1	−11.0
85	2034520	639839	−12.9	−10.8
90	2034526	639855	−13.6	−11.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
95	2034531	639870	−13.5	−11.4
100	2034537	639885	−13.7	−11.6
105	2034543	639901	−13.9	−11.8
110	2034549	639916	−14.3	−12.2
115	2034555	639931	−14.0	−11.9
120	2034560	639947	−14.1	−12.0
125	2034566	639962	−14.7	−12.6
130	2034572	639977	−14.7	−12.6
135	2034578	639993	−14.4	−12.3
140	2034584	640008	−14.7	−12.6
145	2034590	640023	−14.7	−12.6
150	2034595	640039	−14.4	−12.3
155	2034601	640054	−15.4	−13.3
160	2034607	640069	−15.4	−13.3
165	2034613	640085	−15.8	−13.7
170	2034619	640100	−15.0	−12.9
175	2034625	640115	−16.0	−13.9
180	2034630	640131	−16.2	−14.1
185	2034636	640146	−15.8	−13.7
190	2034642	640161	−15.5	−13.4
195	2034648	640177	−15.8	−13.7
200	2034654	640192	−15.9	−13.8
205	2034659	640207	−16.7	−14.6
210	2034665	640223	−15.7	−13.6
215	2034671	640238	−16.7	−14.6
220	2034677	640253	−16.9	−14.8
225	2034683	640269	−17.3	−15.2
230	2034689	640284	−17.4	−15.3
235	2034694	640299	−18.3	−16.2
240	2034700	640315	−16.8	−14.7
245	2034706	640330	−18.2	−16.1
250	2034712	640345	−17.0	−14.9
255	2034718	640361	−17.7	−15.6
260	2034723	640376	−18.4	−16.3
265	2034729	640391	−18.5	−16.4
270	2034735	640407	−18.2	−16.1
275	2034741	640422	−18.4	−16.3
280	2034747	640437	−18.7	−16.6
285	2034753	640453	−18.2	−16.1
290	2034758	640468	−16.9	−14.8
295	2034764	640484	−18.2	−16.1
300	2034770	640499	−18.4	−16.3
305	2034776	640514	−18.6	−16.5
310	2034782	640530	−18.5	−16.4
315	2034787	640545	−18.4	−16.3
320	2034793	640560	−18.7	−16.6
325	2034799	640576	−18.2	−16.1
330	2034805	640591	−19.6	−17.5
335	2034811	640606	−19.5	−17.4
340	2034817	640622	−19.3	−17.2
345	2034822	640637	−19.2	−17.1
350	2034828	640652	−19.5	−17.4
355	2034834	640668	−20.5	−18.4
360	2034840	640683	−19.8	−17.7
365	2034846	640698	−19.2	−17.1
370	2034851	640714	−19.7	−17.6
375	2034857	640729	−19.7	−17.6
380	2034863	640744	−19.7	−17.6
385	2034869	640760	−19.5	−17.4
390	2034875	640775	−20.0	−17.9
395	2034881	640790	−20.4	−18.3
400	2034886	640806	−19.7	−17.6
405	2034892	640821	−20.7	−18.6
410	2034898	640836	−20.9	−18.8
415	2034904	640852	−20.5	−18.4
420	2034910	640867	−20.2	−18.1
425	2034915	640882	−20.5	−18.4
430	2034921	640898	−20.7	−18.6
435	2034927	640913	−20.9	−18.8
440	2034933	640928	−21.6	−19.5
445	2034939	640944	−21.6	−19.5
450	2034945	640959	−21.7	−19.6

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6217

June 24, 1995
Start/End Time: 1207/1216 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.753
Low Water Datum [LWD] Correction feet −2.30

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034149.640	639424.762	8.280	10.340
	2034150.914	639430.909	8.142	10.202
	2034152.720	639435.629	8.137	10.197
	2034152.809	639435.967	9.371	11.431
	2034153.020	639436.728	9.369	11.429
	2034156.036	639441.509	8.360	10.420
	2034158.817	639452.045	4.779	6.839
	2034162.072	639458.201	0.149	2.209
	2034164.495	639461.262	−4.102	−2.042
	2034164.766	639464.646	−6.013	−3.953
	2034166.774	639470.412	−6.215	−4.155
Fathometer Data				
10	2034164	639466	−4.8	−2.7
15	2034170	639481	−5.1	−3.0
20	2034176	639496	−5.5	−3.4
25	2034181	639512	−5.6	−3.5
30	2034187	639527	−5.9	−3.8
35	2034193	639542	−6.3	−4.2
40	2034199	639558	−6.8	−4.7
45	2034205	639573	−7.1	−5.0
50	2034211	639588	−7.5	−5.4
55	2034216	639604	−8.0	−5.9
60	2034222	639619	−8.3	−6.2
65	2034228	639634	−8.6	−6.5
70	2034234	639650	−9.3	−7.2
75	2034240	639665	−9.7	−7.6
80	2034245	639680	−10.0	−7.9
85	2034251	639696	−10.3	−8.2
90	2034257	639711	−10.6	−8.5
95	2034263	639726	−11.0	−8.9
100	2034269	639742	−11.6	−9.5
105	2034275	639757	−11.9	−9.8
110	2034280	639772	−11.8	−9.7
115	2034286	639788	−12.8	−10.7
120	2034292	639803	−13.0	−10.9
125	2034298	639818	−13.1	−11.0
130	2034304	639834	−13.1	−11.0
135	2034309	639849	−13.3	−11.2
140	2034315	639864	−13.0	−10.9
145	2034321	639880	−13.5	−11.4
150	2034327	639895	−14.0	−11.9
155	2034333	639910	−13.9	−11.8
160	2034339	639926	−13.8	−11.7
165	2034344	639941	−13.8	−11.7
170	2034350	639956	−13.8	−11.7
175	2034356	639972	−14.0	−11.9
180	2034362	639987	−13.9	−11.8
185	2034368	640002	−14.4	−12.3
190	2034374	640018	−14.1	−12.0
195	2034379	640033	−14.4	−12.3
200	2034385	640048	−14.8	−12.7
205	2034391	640064	−14.4	−12.3
210	2034397	640079	−15.0	−12.9
215	2034403	640094	−14.8	−12.7
220	2034408	640110	−15.6	−13.5
225	2034414	640125	−15.5	−13.4
230	2034420	640140	−14.8	−12.7
235	2034426	640156	−15.3	−13.2
240	2034432	640171	−16.3	−14.2
245	2034438	640186	−16.2	−14.1
250	2034443	640202	−16.5	−14.4

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
255	2034449	640217	−16.5	−14.4
260	2034455	640232	−16.5	−14.4
265	2034461	640248	−15.3	−13.2
270	2034467	640263	−15.8	−13.7
275	2034472	640278	−16.4	−14.3
280	2034478	640294	−16.4	−14.3
285	2034484	640309	−15.7	−13.6
290	2034490	640324	−16.0	−13.9
295	2034496	640340	−16.3	−14.2
300	2034502	640355	−16.8	−14.7
305	2034507	640370	−17.0	−14.9
310	2034513	640386	−17.0	−14.9
315	2034519	640401	−16.8	−14.7
320	2034525	640416	−16.5	−14.4
325	2034531	640432	−17.3	−15.2
330	2034536	640447	−17.1	−15.0
335	2034542	640462	−17.0	−14.9
340	2034548	640478	−17.7	−15.6
345	2034554	640493	−18.1	−16.0
350	2034560	640508	−17.1	−15.0
355	2034566	640524	−17.0	−14.9
360	2034571	640539	−17.6	−15.5
365	2034577	640554	−17.9	−15.8
370	2034583	640570	−18.3	−16.2
375	2034589	640585	−18.7	−16.6
380	2034595	640601	−19.3	−17.2
385	2034600	640616	−19.6	−17.5
390	2034606	640631	−18.8	−16.7
395	2034612	640647	−19.5	−17.4
400	2034618	640662	−19.8	−17.7
405	2034624	640677	−19.5	−17.4
410	2034630	640693	−19.8	−17.7
415	2034635	640708	−18.8	−16.7
420	2034641	640723	−18.8	−16.7
425	2034647	640739	−18.7	−16.6
430	2034653	640754	−18.0	−15.9
435	2034659	640769	−19.1	−17.0
440	2034664	640785	−19.2	−17.1
445	2034670	640800	−19.7	−17.6
450	2034676	640815	−18.9	−16.8
455	2034682	640831	−18.7	−16.6
460	2034688	640846	−17.9	−15.8
465	2034694	640861	−18.1	−16.0
470	2034699	640877	−19.0	−16.9
475	2034705	640892	−19.3	−17.2
480	2034711	640907	−18.6	−16.5
485	2034717	640923	−19.6	−17.5
490	2034723	640938	−19.5	−17.4
495	2034728	640953	−19.8	−17.7
500	2034734	640969	−19.9	−17.8

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N6017

June 24, 1995
Start/End Time: 1328/1336 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2007.776
Low Water Datum [LWD] Correction feet −2.32

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Pole Prism Data				
	2033964.255	639502.837	8.283	10.343
	2033966.325	639508.454	8.144	10.204
	2033968.126	639513.303	8.087	10.147
	2033968.334	639513.511	9.444	11.504
	2033968.541	639514.235	9.444	11.504
	2033972.289	639524.752	6.963	9.023
	2033975.701	639532.267	7.770	9.830
	2033977.727	639537.206	2.028	4.088
	2033980.134	639542.710	0.827	2.887
	2033983.946	639547.619	−5.448	−3.387
	2033984.239	639551.440	−6.463	−4.403
	2033987.858	639554.218	−6.421	−4.361
Fathometer Data				
13	2033984	639554	−6.6	−4.6
15	2033986	639560	−6.7	−4.7
20	2033992	639576	−6.9	−4.9
25	2033998	639591	−7.3	−5.3
30	2034003	639606	−7.6	−5.6
35	2034009	639622	−8.1	−6.1
40	2034015	639637	−8.5	−6.5
45	2034021	639652	−9.0	−7.0
50	2034027	639668	−9.3	−7.3
55	2034033	639683	−9.7	−7.7
60	2034038	639698	−10.2	−8.2
65	2034044	639714	−10.5	−8.5
70	2034050	639729	−11.6	−9.6
75	2034056	639744	−11.6	−9.6
80	2034062	639760	−11.5	−9.5
85	2034068	639775	−11.5	−9.5
90	2034073	639790	−11.7	−9.7
95	2034079	639806	−12.0	−10.0
100	2034085	639821	−12.2	−10.2
105	2034091	639836	−12.5	−10.5
110	2034097	639852	−12.5	−10.5
115	2034102	639867	−12.5	−10.5
120	2034108	639882	−13.0	−11.0
125	2034114	639898	−13.1	−11.1
130	2034120	639913	−12.9	−10.9
135	2034126	639928	−13.0	−11.0
140	2034132	639944	−12.8	−10.8
145	2034137	639959	−12.9	−10.9
150	2034143	639974	−13.4	−11.4
155	2034149	639990	−13.7	−11.7
160	2034155	640005	−14.3	−12.3
165	2034161	640020	−13.9	−11.9
170	2034166	640036	−13.8	−11.8
175	2034172	640051	−14.2	−12.2
180	2034178	640066	−14.3	−12.3
185	2034184	640082	−14.6	−12.6
190	2034190	640097	−14.6	−12.6
195	2034196	640112	−15.0	−13.0
200	2034201	640128	−14.7	−12.7
205	2034207	640143	−14.5	−12.5
210	2034213	640158	−13.9	−11.9
215	2034219	640174	−14.7	−12.7
220	2034225	640189	−14.8	−12.8
225	2034230	640204	−15.4	−13.4
230	2034236	640220	−15.3	−13.3
235	2034242	640235	−15.0	−13.0
240	2034248	640250	−15.5	−13.5
245	2034254	640266	−16.3	−14.3

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
250	2034260	640281	−15.8	−13.8
255	2034265	640296	−16.0	−14.0
260	2034271	640312	−16.5	−14.5
265	2034277	640327	−16.2	−14.2
270	2034283	640342	−17.0	−15.0
275	2034289	640358	−17.3	−15.3
280	2034294	640373	−17.7	−15.7
285	2034300	640388	−16.7	−14.7
290	2034306	640404	−17.4	−15.4
295	2034312	640419	−17.0	−15.0
300	2034318	640434	−16.7	−14.7
305	2034324	640450	−16.1	−14.1
310	2034329	640465	−17.3	−15.3
315	2034335	640480	−16.9	−14.9
320	2034341	640496	−15.8	−13.8
325	2034347	640511	−16.4	−14.4
330	2034353	640526	−16.8	−14.8
335	2034358	640542	−16.7	−14.7
340	2034364	640557	−16.0	−14.0
345	2034370	640572	−17.5	−15.5
350	2034376	640588	−17.5	−15.5
355	2034382	640603	−17.7	−15.7
360	2034388	640619	−18.3	−16.3
365	2034393	640634	−18.0	−16.0
370	2034399	640649	−18.3	−16.3
375	2034405	640665	−19.1	−17.1
380	2034411	640680	−18.8	−16.8
385	2034417	640695	−18.5	−16.5
390	2034422	640711	−18.9	−16.9
395	2034428	640726	−18.8	−16.8
400	2034434	640741	−20.1	−18.1
405	2034440	640757	−19.6	−17.6
410	2034446	640772	−19.2	−17.2
415	2034452	640787	−18.8	−16.8
420	2034457	640803	−19.1	−17.1
425	2034463	640818	−18.7	−16.7
430	2034469	640833	−18.8	−16.8
435	2034475	640849	−18.7	−16.7
440	2034481	640864	−19.5	−17.5
445	2034486	640879	−19.6	−17.6
450	2034492	640895	−19.7	−17.7
455	2034498	640910	−19.7	−17.7
460	2034504	640925	−19.5	−17.5
465	2034510	640941	−19.9	−17.9
470	2034516	640956	−20.0	−18.0
475	2034521	640971	−19.9	−17.9
480	2034527	640987	−19.6	−17.6
485	2034533	641002	−19.9	−17.9
490	2034539	641017	−18.9	−16.9
495	2034545	641033	−19.0	−17.0
500	2034551	641048	−20.3	−18.3

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5817

June 24, 1995
Start/End Time: 1247/1257 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2014.976
Low Water Datum [LWD] Correction feet −2.33

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Pole Prism Data				
	2033779.943	639580.597	8.272	10.332
	2033782.011	639586.231	8.179	10.239
	2033783.918	639591.036	8.069	10.129
	2033783.899	639591.238	9.392	11.452
	2033783.963	639591.959	9.410	11.470
	2033783.993	639591.957	9.410	11.470
	2033787.613	639600.563	8.680	10.740
	2033790.333	639608.792	7.543	9.603
	2033792.128	639613.562	1.090	3.150
	2033796.064	639623.912	−2.471	−0.411
	2033799.337	639632.102	−0.317	1.743
	2033802.104	639637.024	−2.131	−0.071
	2033802.579	639641.133	−2.757	−0.697
Fathometer Data				
13	2033799	639632	−5.9	−3.9
15	2033802	639638	−6.5	−4.5
20	2033807	639653	−6.9	−4.9
25	2033813	639669	−7.7	−5.7
30	2033819	639684	−8.3	−6.3
35	2033825	639699	−8.7	−6.7
40	2033831	639715	−8.9	−6.9
45	2033837	639730	−9.3	−7.3
50	2033842	639745	−9.7	−7.7
55	2033848	639761	−9.9	−7.9
60	2033854	639776	−10.7	−8.7
65	2033860	639791	−10.9	−8.9
70	2033866	639807	−11.2	−9.2
75	2033871	639822	−11.7	−9.7
80	2033877	639837	−11.2	−9.2
85	2033883	639853	−11.9	−9.9
90	2033889	639868	−12.3	−10.3
95	2033895	639883	−12.5	−10.5
100	2033901	639899	−12.8	−10.8
105	2033906	639914	−13.0	−11.0
110	2033912	639929	−13.1	−11.1
115	2033918	639945	−12.9	−10.9
120	2033924	639960	−12.8	−10.8
125	2033930	639975	−13.3	−11.3
130	2033935	639991	−13.6	−11.6
135	2033941	640006	−13.3	−11.3
140	2033947	640021	−13.5	−11.5
145	2033953	640037	−13.2	−11.2
150	2033959	640052	−13.8	−11.8
155	2033965	640067	−13.8	−11.8
160	2033970	640083	−14.3	−12.3
165	2033976	640098	−14.5	−12.5
170	2033982	640113	−14.3	−12.3
175	2033988	640129	−13.9	−11.9
180	2033994	640144	−14.3	−12.3
185	2033999	640159	−14.3	−12.3
190	2034005	640175	−13.7	−11.7
195	2034011	640190	−14.7	−12.7
200	2034017	640205	−15.3	−13.3
205	2034023	640221	−14.2	−12.2
210	2034029	640236	−14.7	−12.7
215	2034034	640251	−14.1	−12.1
220	2034040	640267	−14.7	−12.7
225	2034046	640282	−14.9	−12.9
230	2034052	640297	−15.2	−13.2
235	2034058	640313	−15.6	−13.6
240	2034063	640328	−14.7	−12.7
245	2034069	640343	−14.5	−12.5
250	2034075	640359	−15.5	−13.5
255	2034081	640374	−15.7	−13.7
260	2034087	640389	−16.9	−14.9
265	2034093	640405	−17.4	−15.4
270	2034098	640420	−17.5	−15.5
275	2034104	640435	−17.7	−15.7
280	2034110	640451	−18.2	−16.2
285	2034116	640466	−17.0	−15.0
290	2034122	640481	−16.4	−14.4
295	2034127	640497	−16.9	−14.9
300	2034133	640512	−17.4	−15.4
305	2034139	640527	−17.7	−15.7
310	2034145	640543	−17.5	−15.5
315	2034151	640558	−18.5	−16.5
320	2034157	640573	−17.8	−15.8
325	2034162	640589	−18.0	−16.0
330	2034168	640604	−18.3	−16.3
335	2034174	640620	−17.7	−15.7
340	2034180	640635	−17.5	−15.5
345	2034186	640650	−17.4	−15.4
350	2034191	640666	−16.7	−14.7
355	2034197	640681	−17.7	−15.7
360	2034203	640696	−18.7	−16.7
365	2034209	640712	−17.7	−15.7
370	2034215	640727	−17.9	−15.9
375	2034221	640742	−18.0	−16.0
380	2034226	640758	−17.9	−15.9
385	2034232	640773	−18.4	−16.4
390	2034238	640788	−18.5	−16.5
395	2034244	640804	−19.4	−17.4
400	2034250	640819	−19.2	−17.2
405	2034255	640834	−19.4	−17.4
410	2034261	640850	−19.4	−17.4
415	2034267	640865	−19.4	−17.4
420	2034273	640880	−19.3	−17.3
425	2034279	640896	−19.7	−17.7
430	2034285	640911	−19.5	−17.5
435	2034290	640926	−19.7	−17.7
440	2034296	640942	−20.2	−18.2
445	2034302	640957	−19.7	−17.7
450	2034308	640972	−20.9	−18.9
455	2034314	640988	−19.7	−17.7
460	2034320	641003	−19.7	−17.7
465	2034325	641018	−19.7	−17.7
470	2034331	641034	−18.6	−16.6
475	2034337	641049	−19.4	−17.4
480	2034343	641064	−19.6	−17.6
485	2034349	641080	−20.3	−18.3
490	2034354	641095	−19.9	−17.9
495	2034360	641110	−20.8	−18.8
500	2034366	641126	−20.7	−18.7

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5617

June 24, 1995
Start/End Time: 1308/1316 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2022.149
Low Water Datum [LWD] Correction feet −2.33

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033595.510	639657.973	8.212	10.272
	2033597.507	639663.010	8.188	10.248
	2033599.503	639668.495	8.073	10.133
	2033599.662	639668.862	9.417	11.477
	2033600.034	639669.427	9.416	11.476
	2033602.375	639675.921	8.436	10.496
	2033604.671	639682.749	7.526	9.586
	2033607.040	639689.963	3.827	5.887
	2033607.699	639693.049	−0.778	1.282
	2033610.524	639699.900	−0.628	1.432
	2033613.627	639703.539	−2.348	−0.288
	2033611.799	639707.752	−6.539	−4.479
Fathometer Data				
10	2033611	639700	−6.3	−4.3
15	2033617	639716	−7.6	−5.6
20	2033623	639731	−7.9	−5.9
25	2033629	639746	−8.4	−6.4
30	2033635	639762	−8.6	−6.6
35	2033640	639777	−9.0	−7.0
40	2033646	639792	−9.5	−7.5
45	2033652	639808	−9.4	−7.4
50	2033658	639823	−9.9	−7.9
55	2033664	639838	−11.2	−9.2
60	2033670	639854	−11.0	−9.0
65	2033675	639869	−11.1	−9.1
70	2033681	639884	−11.5	−9.5
75	2033687	639900	−11.4	−9.4
80	2033693	639915	−11.5	−9.5
85	2033699	639930	−12.2	−10.2
90	2033704	639946	−12.2	−10.2
95	2033710	639961	−11.7	−9.7
100	2033716	639976	−12.7	−10.7
105	2033722	639992	−13.2	−11.2
110	2033728	640007	−12.7	−10.7
115	2033734	640022	−13.1	−11.1
120	2033739	640038	−13.3	−11.3
125	2033745	640053	−12.7	−10.7
130	2033751	640068	−12.7	−10.7
135	2033757	640084	−12.8	−10.8
140	2033763	640099	−13.5	−11.5
145	2033768	640114	−13.4	−11.4
150	2033774	640130	−13.5	−11.5
155	2033780	640145	−13.6	−11.6
160	2033786	640160	−13.6	−11.6
165	2033792	640176	−14.0	−12.0
170	2033798	640191	−14.4	−12.4
175	2033803	640206	−13.7	−11.7
180	2033809	640222	−14.0	−12.0
185	2033815	640237	−14.2	−12.2
190	2033821	640252	−14.2	−12.2
195	2033827	640268	−14.2	−12.2
200	2033832	640283	−13.8	−11.8
205	2033838	640298	−14.5	−12.5
210	2033844	640314	−14.9	−12.9
215	2033850	640329	−14.7	−12.7
220	2033856	640344	−14.9	−12.9
225	2033862	640360	−14.7	−12.7
230	2033867	640375	−14.6	−12.6
235	2033873	640390	−15.0	−13.0
240	2033879	640406	−15.2	−13.2
245	2033885	640421	−16.2	−14.2

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
250	2033891	640436	−16.4	−14.4
255	2033896	640452	−16.7	−14.7
260	2033902	640467	−16.7	−14.7
265	2033908	640482	−16.8	−14.8
270	2033914	640498	−16.7	−14.7
275	2033920	640513	−16.9	−14.9
280	2033926	640528	−17.4	−15.4
285	2033931	640544	−17.5	−15.5
290	2033937	640559	−16.9	−14.9
295	2033943	640574	−17.6	−15.6
300	2033949	640590	−17.4	−15.4
305	2033955	640605	−17.7	−15.7
310	2033960	640620	−18.2	−16.2
315	2033966	640636	−17.6	−15.6
320	2033972	640651	−18.5	−16.5
325	2033978	640666	−18.7	−16.7
330	2033984	640682	−18.4	−16.4
335	2033990	640697	−18.5	−16.5
340	2033995	640712	−18.8	−16.8
345	2034001	640728	−18.5	−16.5
350	2034007	640743	−18.8	−16.8
355	2034013	640759	−19.2	−17.2
360	2034019	640774	−18.7	−16.7
365	2034024	640789	−19.3	−17.3
370	2034030	640805	−19.7	−17.7
375	2034036	640820	−19.2	−17.2
380	2034042	640835	−17.0	−15.0
385	2034048	640851	−18.7	−16.7
390	2034054	640866	−19.0	−17.0
395	2034059	640881	−19.4	−17.4
400	2034065	640897	−18.9	−16.9
405	2034071	640912	−19.7	−17.7
410	2034077	640927	−20.0	−18.0
415	2034083	640943	−19.9	−17.9
420	2034089	640958	−20.0	−18.0
425	2034094	640973	−20.0	−18.0
430	2034100	640989	−19.7	−17.7
435	2034106	641004	−19.7	−17.7
440	2034112	641019	−19.6	−17.6
445	2034118	641035	−20.2	−18.2
450	2034123	641050	−19.9	−17.9
455	2034129	641065	−19.5	−17.5
460	2034135	641081	−19.2	−17.2
465	2034141	641096	−20.7	−18.7
470	2034147	641111	−19.9	−17.9
475	2034153	641127	−19.5	−17.5
480	2034158	641142	−20.3	−18.3
485	2034164	641157	−20.2	−18.2
490	2034170	641173	−19.7	−17.7
495	2034176	641188	−20.4	−18.4
500	2034182	641203	−20.4	−18.4

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5417

June 24, 1995
Start/End Time: 1546/1554 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1829.424
Low Water Datum [LWD] Correction feet −2.36

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033337.116	639537.860	8.135	10.195
	2033339.339	639545.983	8.751	10.811
	2033344.409	639560.285	8.996	11.056
	2033344.623	639561.237	5.231	7.291
	2033347.464	639568.936	2.791	4.851
	2033350.648	639581.972	0.514	2.574
	2033349.066	639584.986	−0.977	1.083
	2033354.719	639598.157	−1.772	0.288
	2033361.839	639606.375	−2.472	−0.412
	2033364.531	639618.602	−3.280	−1.220
	2033367.038	639627.826	−4.149	−2.089
	2033372.010	639642.202	−4.896	−2.836
	2033377.369	639656.368	−5.232	−3.172
	2033384.330	639671.431	−5.284	−3.224
	2033385.975	639675.588	−5.250	−3.190
	2033387.940	639679.985	−5.623	−3.562
	2033389.309	639684.942	−6.001	−3.941
	2033389.758	639690.137	0.088	2.148
Fathometer Data				
20	2033368	639622	−2.5	−0.4
25	2033373	639637	−3.2	−1.1
30	2033379	639652	−4.4	−2.3
35	2033385	639668	−4.7	−2.6
40	2033391	639683	−5.8	−3.7
45	2033397	639698	−6.5	−4.4
50	2033403	639714	−6.7	−4.6
55	2033408	639729	−7.4	−5.3
60	2033414	639744	−7.7	−5.6
65	2033420	639760	−8.0	−5.9
70	2033426	639775	−8.5	−6.4
75	2033432	639790	−8.9	−6.8
80	2033437	639806	−9.1	−7.0
85	2033443	639821	−9.5	−7.4
90	2033449	639836	−9.6	−7.5
95	2033455	639852	−10.2	−8.1
100	2033461	639867	−10.6	−8.5
105	2033467	639882	−10.9	−8.8
110	2033472	639898	−10.8	−8.7
115	2033478	639913	−11.6	−9.5
120	2033484	639928	−11.5	−9.4
125	2033490	639944	−11.7	−9.6
130	2033496	639959	−12.0	−9.9
135	2033501	639974	−11.9	−9.8
140	2033507	639990	−12.0	−9.9
145	2033513	640005	−12.6	−10.5
150	2033519	640020	−12.4	−10.3
155	2033525	640036	−11.9	−9.8
160	2033531	640051	−12.0	−9.9
165	2033536	640066	−12.8	−10.7
170	2033542	640082	−12.2	−10.1
175	2033548	640097	−12.5	−10.4
180	2033554	640112	−12.5	−10.4
185	2033560	640128	−13.5	−11.4
190	2033565	640143	−12.7	−10.6
195	2033571	640158	−13.0	−10.9
200	2033577	640174	−13.2	−11.1
205	2033583	640189	−13.9	−11.8
210	2033589	640204	−12.9	−10.8
215	2033595	640220	−13.5	−11.4
220	2033600	640235	−13.7	−11.6
225	2033606	640250	−13.5	−11.4

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
230	2033612	640266	−14.3	−12.2
235	2033618	640281	−14.5	−12.4
240	2033624	640297	−15.0	−12.9
245	2033629	640312	−14.2	−12.1
250	2033635	640327	−14.2	−12.1
255	2033641	640343	−14.4	−12.3
260	2033647	640358	−14.5	−12.4
265	2033653	640373	−15.2	−13.1
270	2033659	640389	−15.1	−13.0
275	2033664	640404	−15.3	−13.2
280	2033670	640419	−15.7	−13.6
285	2033676	640435	−15.7	−13.6
290	2033682	640450	−16.0	−13.9
295	2033688	640465	−15.8	−13.7
300	2033693	640481	−15.7	−13.6
305	2033699	640496	−16.8	−14.7
310	2033705	640511	−16.0	−13.9
315	2033711	640527	−15.7	−13.6
320	2033717	640542	−16.6	−14.5
325	2033723	640557	−17.6	−15.5
330	2033728	640573	−16.2	−14.1
335	2033734	640588	−17.5	−15.4
340	2033740	640603	−17.9	−15.8
345	2033746	640619	−17.5	−15.4
350	2033752	640634	−17.7	−15.6
355	2033757	640649	−17.9	−15.8
360	2033763	640665	−17.7	−15.6
365	2033769	640680	−17.5	−15.4
370	2033775	640695	−16.7	−14.6
375	2033781	640711	−16.8	−14.7
380	2033787	640726	−18.8	−16.7
385	2033792	640741	−19.4	−17.3
390	2033798	640757	−19.4	−17.3
395	2033804	640772	−19.4	−17.3
400	2033810	640787	−20.0	−17.9
405	2033816	640803	−19.7	−17.6
410	2033822	640818	−19.9	−17.8
415	2033827	640833	−19.6	−17.5
420	2033833	640849	−20.0	−17.9
425	2033839	640864	−20.0	−17.9
430	2033845	640879	−19.7	−17.6
435	2033851	640895	−19.9	−17.8
440	2033856	640910	−20.4	−18.3
445	2033862	640925	−20.4	−18.3
450	2033868	640941	−20.2	−18.1
455	2033874	640956	−20.2	−18.1
460	2033880	640971	−19.9	−17.8
465	2033886	640987	−19.7	−17.6
470	2033891	641002	−19.7	−17.6
475	2033897	641017	−20.2	−18.1
480	2033903	641033	−20.6	−18.5
485	2033909	641048	−20.6	−18.5
490	2033915	641063	−20.6	−18.5
495	2033920	641079	−20.4	−18.3
500	2033926	641094	−20.2	−18.1

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5267

June 24, 1995
Start/End Time: 1505/1512 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1792.403
Low Water Datum [LWD] Correction feet −2.33

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2033187.519	639561.081	11.203	13.263
	2033190.118	639570.959	9.570	11.630
	2033191.050	639578.877	8.717	10.777
	2033193.718	639585.740	7.660	9.720
	2033194.066	639587.315	−1.127	0.933
	2033196.343	639595.356	−0.988	1.072
	2033197.953	639604.431	−2.174	−0.114
	2033206.082	639617.946	−3.696	−1.636
	2033211.014	639630.100	−4.572	−2.512
	2033213.408	639639.866	−4.989	−2.929
	2033214.427	639648.436	−5.602	−3.542
	2033215.746	639651.927	−5.556	−3.496
Fathometer Data				
12	2033205	639616	−4.3	−2.3
15	2033208	639625	−4.7	−2.7
20	2033214	639640	−5.5	−3.5
25	2033220	639656	−5.6	−3.6
30	2033226	639671	−5.3	−3.3
35	2033232	639686	−5.6	−3.6
40	2033238	639702	−5.7	−3.7
45	2033243	639717	−5.7	−3.7
50	2033249	639732	−5.7	−3.7
55	2033255	639748	−6.3	−4.3
60	2033261	639763	−6.9	−4.9
65	2033267	639778	−7.2	−5.2
70	2033272	639794	−7.9	−5.9
75	2033278	639809	−8.3	−6.3
80	2033284	639824	−8.7	−6.7
85	2033290	639840	−8.7	−6.7
90	2033296	639855	−9.5	−7.5
95	2033302	639870	−9.2	−7.2
100	2033307	639886	−9.1	−7.1
105	2033313	639901	−9.5	−7.5
110	2033319	639916	−10.3	−8.3
115	2033325	639932	−9.8	−7.8
120	2033331	639947	−10.6	−8.6
125	2033336	639962	−10.7	−8.7
130	2033342	639978	−10.9	−8.9
135	2033348	639993	−10.8	−8.8
140	2033354	640008	−11.7	−9.7
145	2033360	640024	−12.3	−10.3
150	2033366	640039	−12.5	−10.5
155	2033371	640054	−11.9	−9.9
160	2033377	640070	−11.9	−9.9
165	2033383	640085	−12.4	−10.4
170	2033389	640100	−12.6	−10.6
175	2033395	640116	−12.3	−10.3
180	2033400	640131	−12.3	−10.3
185	2033406	640146	−12.7	−10.7
190	2033412	640162	−12.1	−10.1
195	2033418	640177	−13.0	−11.0
200	2033424	640192	−13.0	−11.0
205	2033430	640208	−13.7	−11.7
210	2033435	640223	−13.3	−11.3
215	2033441	640238	−13.9	−11.9
220	2033447	640254	−13.5	−11.5
225	2033453	640269	−13.7	−11.7
230	2033459	640284	−13.7	−11.7
235	2033464	640300	−13.5	−11.5
240	2033470	640315	−14.0	−12.0
245	2033476	640330	−14.0	−12.0

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
250	2033482	640346	−14.2	−12.2
255	2033488	640361	−14.5	−12.5
260	2033494	640376	−14.7	−12.7
265	2033499	640392	−15.2	−13.2
270	2033505	640407	−14.9	−12.9
275	2033511	640422	−15.7	−13.7
280	2033517	640438	−15.3	−13.3
285	2033523	640453	−15.7	−13.7
290	2033528	640468	−15.7	−13.7
295	2033534	640484	−15.7	−13.7
300	2033540	640499	−15.9	−13.9
305	2033546	640514	−15.8	−13.8
310	2033552	640530	−15.9	−13.9
315	2033558	640545	−15.2	−13.2
320	2033563	640561	−15.5	−13.5
325	2033569	640576	−15.0	−13.0
330	2033575	640591	−15.9	−13.9
335	2033581	640607	−16.7	−14.7
340	2033587	640622	−17.7	−15.7
345	2033592	640637	−17.3	−15.3
350	2033598	640653	−17.4	−15.4
355	2033604	640668	−17.7	−15.7
360	2033610	640683	−18.2	−16.2
365	2033616	640699	−18.5	−16.5
370	2033622	640714	−19.2	−17.2
375	2033627	640729	−18.1	−16.1
380	2033633	640745	−17.7	−15.7
385	2033639	640760	−17.9	−15.9
390	2033645	640775	−18.7	−16.7
395	2033651	640791	−18.0	−16.0
400	2033656	640806	−18.2	−16.2
405	2033662	640821	−19.0	−17.0
410	2033668	640837	−18.9	−16.9
415	2033674	640852	−19.7	−17.7
420	2033680	640867	−19.9	−17.9
425	2033686	640883	−19.7	−17.7
430	2033691	640898	−18.4	−16.4
435	2033697	640913	−18.7	−16.7
440	2033703	640929	−19.7	−17.7
445	2033709	640944	−20.0	−18.0
450	2033715	640959	−18.6	−16.6
455	2033721	640975	−19.7	−17.7
460	2033726	640990	−19.7	−17.7
465	2033732	641005	−19.5	−17.5
470	2033738	641021	−19.7	−17.7
475	2033744	641036	−20.4	−18.4
480	2033750	641051	−19.9	−17.9
485	2033755	641067	−20.0	−18.0
490	2033761	641082	−19.7	−17.7
495	2033767	641097	−20.4	−18.4
500	2033773	641113	−18.6	−16.6

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N5067

June 24, 1995
Start/End Time: 1524/1535 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1781.152
Low Water Datum [LWD] Correction feet −2.34

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032990.342	639613.867	10.951	13.011
	2032993.970	639623.848	8.914	10.974
	2032996.938	639630.971	8.468	10.528
	2032999.984	639639.338	8.066	10.126
	2033000.700	639640.987	4.613	6.673
	2033001.770	639645.110	3.549	5.609
	2033006.366	639655.334	2.756	4.816
	2033009.065	639662.824	2.176	4.236
	2033009.954	639665.106	1.723	3.783
	2033011.291	639669.575	1.124	3.184
	2033013.520	639672.701	0.181	2.241
	2033015.433	639681.269	−1.088	0.972
	2033017.189	639689.401	−2.379	−0.319
	2033021.118	639698.355	−3.909	−1.849
	2033023.964	639707.134	−5.174	−3.114
	2033026.619	639712.303	−5.581	−3.521
	2033029.332	639720.044	−6.063	−4.003
	2033034.181	639731.167	−6.508	−4.448
	2033039.385	639742.066	−7.223	−5.163
	2033042.761	639749.938	−8.995	−6.935
Fathometer Data				
25	2033029	639716	−6.5	−4.5
30	2033035	639731	−7.7	−5.7
35	2033041	639747	−7.4	−5.4
40	2033047	639762	−7.0	−5.0
45	2033052	639777	−7.2	−5.2
50	2033058	639793	−7.6	−5.6
55	2033064	639808	−8.0	−6.0
60	2033070	639823	−8.3	−6.3
65	2033076	639839	−8.7	−6.7
70	2033081	639854	−8.9	−6.9
75	2033087	639869	−8.5	−6.5
80	2033093	639885	−8.4	−6.4
85	2033099	639900	−8.5	−6.5
90	2033105	639915	−8.7	−6.7
95	2033111	639931	−8.6	−6.6
100	2033116	639946	−8.7	−6.7
105	2033122	639961	−8.8	−6.8
110	2033128	639977	−8.8	−6.8
115	2033134	639992	−9.0	−7.0
120	2033140	640007	−9.4	−7.4
125	2033145	640023	−9.5	−7.5
130	2033151	640038	−9.7	−7.7
135	2033157	640053	−10.0	−8.0
140	2033163	640069	−10.4	−8.4
145	2033169	640084	−10.5	−8.5
150	2033175	640099	−10.7	−8.7
155	2033180	640115	−11.7	−9.7
160	2033186	640130	−11.3	−9.3
165	2033192	640145	−11.9	−9.9
170	2033198	640161	−11.7	−9.7
175	2033204	640176	−12.3	−10.3
180	2033209	640191	−12.3	−10.3
185	2033215	640207	−11.9	−9.9
190	2033221	640222	−12.7	−10.7
195	2033227	640238	−12.9	−10.9
200	2033233	640253	−13.2	−11.2
205	2033239	640268	−13.3	−11.3
210	2033244	640284	−13.5	−11.5
215	2033250	640299	−13.2	−11.2
220	2033256	640314	−13.5	−11.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
225	2033262	640330	−13.6	−11.6
230	2033268	640345	−13.9	−11.9
235	2033273	640360	−13.5	−11.5
240	2033279	640376	−13.9	−11.9
245	2033285	640391	−14.0	−12.0
250	2033291	640406	−13.7	−11.7
255	2033297	640422	−14.3	−12.3
260	2033303	640437	−14.4	−12.4
265	2033308	640452	−14.3	−12.3
270	2033314	640468	−14.6	−12.6
275	2033320	640483	−14.7	−12.7
280	2033326	640498	−14.7	−12.7
285	2033332	640514	−15.0	−13.0
290	2033337	640529	−14.8	−12.8
295	2033343	640544	−15.3	−13.3
300	2033349	640560	−15.4	−13.4
305	2033355	640575	−14.7	−12.7
310	2033361	640590	−16.0	−14.0
315	2033367	640606	−16.5	−14.5
320	2033372	640621	−16.7	−14.7
325	2033378	640636	−16.2	−14.2
330	2033384	640652	−16.3	−14.3
335	2033390	640667	−16.4	−14.4
340	2033396	640682	−16.2	−14.2
345	2033401	640698	−17.3	−15.3
350	2033407	640713	−16.9	−14.9
355	2033413	640728	−17.7	−15.7
360	2033419	640744	−17.7	−15.7
365	2033425	640759	−17.8	−15.8
370	2033431	640774	−17.9	−15.9
375	2033436	640790	−18.2	−16.2
380	2033442	640805	−18.2	−16.2
385	2033448	640820	−18.5	−16.5
390	2033454	640836	−18.4	−16.4
395	2033460	640851	−19.2	−17.2
400	2033466	640866	−19.0	−17.0
405	2033471	640882	−19.3	−17.3
410	2033477	640897	−18.7	−16.7
415	2033483	640912	−19.4	−17.4
420	2033489	640928	−19.7	−17.7
425	2033495	640943	−19.2	−17.2
430	2033500	640958	−19.4	−17.4
435	2033506	640974	−19.4	−17.4
440	2033512	640989	−19.5	−17.5
445	2033518	641004	−18.9	−16.9
450	2033524	641020	−19.4	−17.4
455	2033530	641035	−19.5	−17.5
460	2033535	641050	−19.2	−17.2
465	2033541	641066	−18.7	−16.7
470	2033547	641081	−18.9	−16.9
475	2033553	641096	−19.0	−17.0
480	2033559	641112	−17.7	−15.7
485	2033564	641127	−18.7	−16.7
490	2033570	641142	−18.8	−16.8
495	2033576	641158	−19.6	−17.6
500	2033582	641173	−18.7	−16.7

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4867

June 24, 1995
Start/End Time: 1552/1558 CST

MiniRanger (MR) Easting
Lake Forest Coordinates [LFC] feet 1758.036
Low Water Datum [LWD] Correction feet −2.36

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032794.277	639660.420	7.818	9.878
	2032796.637	639666.737	8.607	10.667
	2032800.660	639678.497	7.024	9.084
	2032804.573	639688.757	5.191	7.251
	2032803.943	639689.080	3.937	5.997
	2032807.096	639697.881	2.993	5.053
	2032809.740	639705.363	2.179	4.239
	2032812.505	639713.652	1.786	3.846
	2032815.251	639719.681	1.348	3.408
	2032817.266	639725.974	0.401	2.461
	2032820.150	639733.325	0.264	2.324
	2032821.301	639733.714	−0.941	1.119
	2032822.734	639741.949	−2.223	−0.163
	2032824.645	639749.169	−3.145	−1.085
	2032826.438	639756.589	−4.175	−2.115
	2032830.480	639763.216	−4.688	−2.628
	2032833.958	639771.448	−5.262	−3.202
	2032838.512	639779.414	5.189	7.249
Fathometer Data				
15	2032822	639735	−1.5	0.6
20	2032828	639750	−4.0	−1.9
25	2032834	639765	−4.9	−2.8
30	2032840	639781	−5.6	−3.5
35	2032846	639796	−6.3	−4.2
40	2032851	639811	−6.8	−4.7
45	2032857	639827	−7.3	−5.2
50	2032863	639842	−7.8	−5.7
55	2032869	639857	−8.0	−5.9
60	2032875	639873	−8.4	−6.3
65	2032880	639888	−8.9	−6.8
70	2032886	639903	−8.8	−6.7
75	2032892	639919	−9.3	−7.2
80	2032898	639934	−9.4	−7.3
85	2032904	639949	−9.5	−7.4
90	2032910	639965	−8.8	−6.7
95	2032915	639980	−8.7	−6.6
100	2032921	639995	−8.7	−6.6
105	2032927	640011	−8.7	−6.6
110	2032933	640026	−8.6	−6.5
115	2032939	640041	−8.7	−6.6
120	2032944	640057	−8.7	−6.6
125	2032950	640072	−8.9	−6.8
130	2032956	640087	−9.0	−6.9
135	2032962	640103	−9.3	−7.2
140	2032968	640118	−9.6	−7.5
145	2032974	640133	−9.8	−7.7
150	2032979	640149	−10.1	−8.0
155	2032985	640164	−10.4	−8.3
160	2032991	640179	−10.8	−8.7
165	2032997	640195	−12.0	−9.9
170	2033003	640210	−12.4	−10.3
175	2033008	640225	−13.2	−11.1
180	2033014	640241	−12.7	−10.6
185	2033020	640256	−13.5	−11.4
190	2033026	640271	−12.9	−10.8
195	2033032	640287	−13.3	−11.2
200	2033038	640302	−12.9	−10.8
205	2033043	640318	−13.7	−11.6
210	2033049	640333	−13.5	−11.4
215	2033055	640348	−13.7	−11.6
220	2033061	640364	−14.0	−11.9
225	2033067	640379	−13.5	−11.4
230	2033072	640394	−14.2	−12.1
235	2033078	640410	−14.5	−12.4
240	2033084	640425	−14.5	−12.4
245	2033090	640440	−13.9	−11.8
250	2033096	640456	−13.7	−11.6
255	2033102	640471	−13.9	−11.8
260	2033107	640486	−13.8	−11.7
265	2033113	640502	−14.3	−12.2
270	2033119	640517	−14.9	−12.8
275	2033125	640532	−14.4	−12.3
280	2033131	640548	−14.5	−12.4
285	2033136	640563	−14.4	−12.3
290	2033142	640578	−14.2	−12.1
295	2033148	640594	−14.7	−12.6
300	2033154	640609	−14.0	−11.9
305	2033160	640624	−14.9	−12.8
310	2033166	640640	−14.4	−12.3
315	2033171	640655	−15.3	−13.2
320	2033177	640670	−15.3	−13.2
325	2033183	640686	−16.0	−13.9
330	2033189	640701	−16.2	−14.1
335	2033195	640716	−16.1	−14.0
340	2033200	640732	−15.7	−13.6
345	2033206	640747	−15.9	−13.8
350	2033212	640762	−16.3	−14.2
355	2033218	640778	−16.7	−14.6
360	2033224	640793	−17.4	−15.3
365	2033230	640808	−16.7	−14.6
370	2033235	640824	−17.4	−15.3
375	2033241	640839	−18.0	−15.9
380	2033247	640854	−17.8	−15.7
385	2033253	640870	−17.9	−15.8
390	2033259	640885	−18.0	−15.9
395	2033264	640900	−18.4	−16.3
400	2033270	640916	−18.5	−16.4
405	2033276	640931	−18.3	−16.2
410	2033282	640946	−17.5	−15.4
415	2033288	640962	−17.7	−15.6
420	2033294	640977	−17.9	−15.8
425	2033299	640992	−18.4	−16.3
430	2033305	641008	−18.5	−16.4
435	2033311	641023	−18.2	−16.1
440	2033317	641038	−18.2	−16.1
445	2033323	641054	−19.4	−17.3
450	2033329	641069	−19.3	−17.2
455	2033334	641084	−19.0	−16.9
460	2033340	641100	−18.3	−16.2
465	2033346	641115	−18.4	−16.3
470	2033352	641130	−19.2	−17.1
475	2033358	641146	−18.7	−16.6
480	2033363	641161	−19.3	−17.2
485	2033369	641176	−19.7	−17.6
490	2033375	641192	−18.6	−16.5
495	2033381	641207	−19.1	−17.0
500	2033387	641222	−19.3	−17.2

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4667

June 24, 1995
Start/End Time: 1653/1659 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1844.536
Low Water Datum [LWD] Correction feet −2.38

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2032593.757	639694.917	9.8	11.8
	2032594.662	639698.107	8.5	10.6
	2032595.122	639701.072	7.2	9.3
	2032600.205	639713.151	6.8	8.8
	2032602.127	639717.535	6.5	8.6
	2032603.054	639721.610	6.2	8.3
	2032605.664	639728.494	5.9	7.9
	2032608.583	639736.255	5.6	7.6
	2032611.419	639744.567	5.0	7.0
	2032614.642	639753.709	4.6	6.7
	2032617.510	639761.686	4.7	6.7
	2032620.139	639770.054	4.7	6.7
	2032623.220	639777.867	4.3	6.4
	2032626.088	639786.229	3.8	5.9
	2032628.895	639793.799	3.4	5.5
	2032631.567	639801.941	2.7	4.8
	2032634.083	639808.687	2.3	4.3
	2032636.801	639816.789	1.8	3.9
	2032639.009	639824.322	1.5	3.5
	2032639.011	639824.500	2.6	4.7
	2032641.598	639830.202	7.8	9.8
	2032642.685	639837.901	7.9	9.9
	2032648.397	639840.530	6.6	8.7
	2032648.803	639847.963	4.2	6.3
	2032654.094	639858.183	−3.4	−1.4
	2032655.913	639863.438	−4.7	−2.7
	2032658.182	639868.140	−5.1	−3.0
	2032659.382	639870.381	−5.5	−3.4
Fathometer Data				
3	2032652	639850	−4.2	−2.1
10	2032660	639871	−6.3	−4.2
15	2032666	639887	−6.9	−4.8
20	2032672	639902	−7.5	−5.4
25	2032678	639917	−7.9	−5.8
30	2032683	639933	−8.4	−6.3
35	2032689	639948	−8.8	−6.7
40	2032695	639963	−9.2	−7.1
45	2032701	639979	−9.9	−7.8
50	2032707	639994	−10.6	−8.5
55	2032712	640009	−10.4	−8.3
60	2032718	640025	−10.2	−8.1
65	2032724	640040	−10.2	−8.1
70	2032730	640055	−9.7	−7.6
75	2032736	640071	−9.9	−7.8
80	2032742	640086	−9.6	−7.5
85	2032747	640101	−9.5	−7.4
90	2032753	640117	−9.5	−7.4
95	2032759	640132	−9.5	−7.4
100	2032765	640147	−9.5	−7.4
105	2032771	640163	−9.5	−7.4
110	2032776	640178	−9.5	−7.4
115	2032782	640193	−9.8	−7.7
120	2032788	640209	−9.8	−7.7
125	2032794	640224	−9.8	−7.7
130	2032800	640239	−10.4	−8.3
135	2032806	640255	−10.7	−8.6
140	2032811	640270	−10.8	−8.7
145	2032817	640285	−11.0	−8.9
150	2032823	640301	−10.9	−8.8
155	2032829	640316	−12.2	−10.1
160	2032835	640331	−12.6	−10.5
165	2032841	640347	−12.7	−10.6
170	2032846	640362	−12.0	−9.9
175	2032852	640377	−12.9	−10.8
180	2032858	640393	−13.5	−11.4
185	2032864	640408	−13.7	−11.6
190	2032870	640423	−13.6	−11.5
195	2032875	640439	−12.9	−10.8
200	2032881	640454	−13.3	−11.2
205	2032887	640469	−12.9	−10.8
210	2032893	640485	−13.5	−11.4
215	2032899	640500	−14.2	−12.1
220	2032905	640515	−14.2	−12.1
225	2032910	640531	−13.9	−11.8
230	2032916	640546	−14.5	−12.4
235	2032922	640561	−14.9	−12.8
240	2032928	640577	−14.2	−12.1
245	2032934	640592	−14.7	−12.6
250	2032939	640607	−14.1	−12.0
255	2032945	640623	−14.2	−12.1
260	2032951	640638	−14.4	−12.3
265	2032957	640653	−15.6	−13.5
270	2032963	640669	−15.5	−13.4
275	2032969	640684	−15.6	−13.5
280	2032974	640699	−15.9	−13.8
285	2032980	640715	−14.4	−12.3
290	2032986	640730	−15.6	−13.5
295	2032992	640745	−15.8	−13.7
300	2032998	640761	−16.6	−14.5
305	2033003	640776	−16.2	−14.1
310	2033009	640791	−16.2	−14.1
315	2033015	640807	−16.4	−14.3
320	2033021	640822	−16.9	−14.8
325	2033027	640837	−17.8	−15.7
330	2033033	640853	−17.5	−15.4
335	2033038	640868	−17.0	−14.9
340	2033044	640883	−17.7	−15.6
345	2033050	640899	−16.7	−14.6
350	2033056	640914	−17.2	−15.1
355	2033062	640929	−17.7	−15.6
360	2033067	640945	−17.7	−15.6
365	2033073	640960	−18.3	−16.2
370	2033079	640975	−17.8	−15.7
375	2033085	640991	−17.9	−15.8
380	2033091	641006	−18.0	−15.9
385	2033097	641021	−18.2	−16.1
390	2033102	641037	−18.4	−16.3
395	2033108	641052	−18.8	−16.7
400	2033114	641067	−19.2	−17.1
405	2033120	641083	−19.5	−17.4
410	2033126	641098	−19.2	−17.1
415	2033131	641114	−19.2	−17.1
420	2033137	641129	−18.8	−16.7
425	2033143	641144	−19.4	−17.3
430	2033149	641160	−18.7	−16.6
435	2033155	641175	−19.1	−17.0
440	2033161	641190	−18.6	−16.5
445	2033166	641206	−18.4	−16.3
450	2033172	641221	−18.5	−16.4
455	2033178	641236	−19.2	−17.1
460	2033184	641252	−19.4	−17.3
465	2033190	641267	−19.7	−17.6
470	2033195	641282	−20.2	−18.1
475	2033201	641298	−19.7	−17.6
480	2033207	641313	−19.4	−17.3
485	2033213	641328	−20.4	−18.3
490	2033219	641344	−19.7	−17.6
495	2033225	641359	−20.0	−17.9
500	2033230	641374	−19.7	−17.6

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE N4467

June 24, 1995
Start/End Time: 1709/1715 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1749.425
Low Water Datum [LWD] Correction feet −2.38

Prism Pole Data

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
	2032399.345	639748.449	12.548	14.608
	2032400.372	639750.795	11.381	13.441
	2032401.094	639752.216	10.108	12.168
	2032402.419	639755.810	9.635	11.695
	2032403.322	639758.513	9.550	11.610
	2032406.435	639768.147	9.655	11.715
	2032408.488	639774.466	9.047	11.107
	2032411.470	639779.800	7.698	9.758
	2032413.128	639785.266	6.272	8.332
	2032416.043	639792.214	5.261	7.321
	2032417.990	639797.619	5.181	7.241
	2032419.736	639802.072	5.866	7.926
	2032422.191	639807.858	5.868	7.928
	2032424.268	639812.987	5.216	7.276
	2032427.743	639822.524	5.465	7.525
	2032429.595	639826.797	4.734	6.794
	2032433.676	639836.790	2.953	5.013
	2032436.369	639844.842	2.796	4.856
	2032439.249	639851.939	2.263	4.323
	2032440.838	639856.192	2.078	4.138
	2032442.331	639860.127	1.443	3.503
	2032444.023	639864.950	0.691	2.751
	2032445.837	639867.504	0.103	2.163
	2032449.539	639877.735	−1.341	0.719
	2032450.075	639880.721	−1.979	0.081
	2032449.539	639882.271	1.593	3.653
	2032451.679	639885.964	1.860	3.920
	2032453.466	639892.040	1.162	3.222
	2032453.521	639894.738	4.061	6.121
	2032453.208	639900.639	2.723	4.783
	2032457.254	639907.278	1.216	3.276
	2032461.305	639912.512	−2.503	−0.443
	2032462.232	639913.457	−5.708	−3.648
	2032463.504	639921.747	−5.604	−3.544
	2032465.538	639922.735	−6.182	−4.122

Fathometer Data

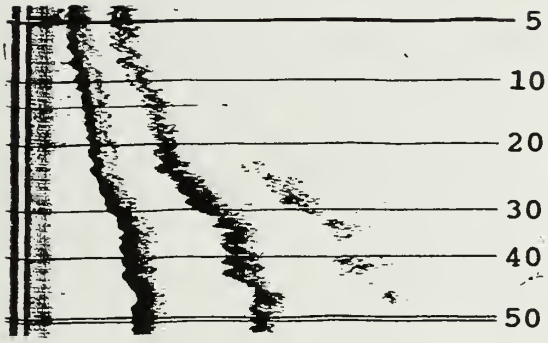
MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
27	2032459	639905	−3.8	−1.7
30	2032463	639915	−5.6	−3.5
35	2032468	639930	−6.8	−4.7
40	2032474	639945	−7.4	−5.3
45	2032480	639961	−8.0	−5.9
50	2032486	639976	−8.3	−6.2
55	2032492	639991	−8.7	−6.6
60	2032498	640007	−9.9	−7.8
65	2032503	640022	−9.7	−7.6
70	2032509	640037	−9.8	−7.7
75	2032515	640053	−10.5	−8.4
80	2032521	640068	−10.4	−8.3
85	2032527	640083	−10.1	−8.0
90	2032532	640099	−9.9	−7.8
95	2032538	640114	−10.6	−8.5
100	2032544	640129	−10.2	−8.1
105	2032550	640145	−10.4	−8.3
110	2032556	640160	−9.9	−7.8
115	2032562	640175	−9.7	−7.6
120	2032567	640191	−9.8	−7.7
125	2032573	640206	−9.8	−7.7
130	2032579	640221	−9.7	−7.6
135	2032585	640237	−9.6	−7.5
140	2032591	640252	−9.6	−7.5
145	2032596	640267	−9.6	−7.5
150	2032602	640283	−9.7	−7.6
155	2032608	640298	−9.9	−7.8
160	2032614	640313	−10.0	−7.9
165	2032620	640329	−10.1	−8.0
170	2032626	640344	−10.6	−8.5
175	2032631	640359	−10.7	−8.6
180	2032637	640375	−10.8	−8.7
185	2032643	640390	−10.2	−8.1
190	2032649	640405	−11.7	−9.6
195	2032655	640421	−12.7	−10.6
200	2032661	640436	−12.7	−10.6
205	2032666	640451	−13.2	−11.1
210	2032672	640467	−13.8	−11.7
215	2032678	640482	−12.8	−10.7
220	2032684	640497	−12.3	−10.2
225	2032690	640513	−11.7	−9.6
230	2032695	640528	−12.7	−10.6
235	2032701	640543	−12.7	−10.6
240	2032707	640559	−13.7	−11.6
245	2032713	640574	−14.0	−11.9
250	2032719	640589	−14.7	−12.6
255	2032725	640605	−14.2	−12.1
260	2032730	640620	−14.2	−12.1
265	2032736	640635	−14.3	−12.2
270	2032742	640651	−14.5	−12.4
275	2032748	640666	−14.9	−12.8
280	2032754	640681	−15.2	−13.1
285	2032759	640697	−14.8	−12.7
290	2032765	640712	−15.4	−13.3
295	2032771	640727	−15.5	−13.4
300	2032777	640743	−15.5	−13.4
305	2032783	640758	−15.9	−13.8
310	2032789	640773	−16.4	−14.3
315	2032794	640789	−15.7	−13.6
320	2032800	640804	−16.7	−14.6
325	2032806	640819	−16.9	−14.8
330	2032812	640835	−15.7	−13.6
335	2032818	640850	−16.3	−14.2
340	2032823	640865	−15.9	−13.8
345	2032829	640881	−16.7	−14.6
350	2032835	640896	−16.9	−14.8
355	2032841	640911	−16.5	−14.4
360	2032847	640927	−17.0	−14.9
365	2032853	640942	−17.7	−15.6
370	2032858	640957	−17.7	−15.6
375	2032864	640973	−17.2	−15.1
380	2032870	640988	−16.9	−14.8
385	2032876	641004	−17.5	−15.4
390	2032882	641019	−17.4	−15.3
395	2032887	641034	−16.9	−14.8
400	2032893	641050	−18.0	−15.9
405	2032899	641065	−17.4	−15.3
410	2032905	641080	−18.2	−16.1
415	2032911	641096	−17.7	−15.6
420	2032917	641111	−18.2	−16.1
425	2032922	641126	−18.4	−16.3
430	2032928	641142	−18.4	−16.3
435	2032934	641157	−19.0	−16.9
440	2032940	641172	−19.2	−17.1
445	2032946	641188	−18.7	−16.6
450	2032951	641203	−18.5	−16.4
455	2032957	641218	−18.7	−16.6
460	2032963	641234	−18.8	−16.7
465	2032969	641249	−18.7	−16.6
470	2032975	641264	−17.7	−15.6
475	2032981	641280	−19.2	−17.1
480	2032986	641295	−18.2	−16.1
485	2032992	641310	−18.9	−16.8
490	2032998	641326	−19.0	−16.9
495	2033004	641341	−19.7	−17.6
500	2033010	641356	−19.4	−17.3

APPENDIX F ISGS FATHOMETER TRACES FOR THE BOAT-LAUNCH BASIN SURVEYS

The following are photo-reduced copies of the ISGS fathometer strip-charts for the survey conducted in the boat-launch basin. Vertical lines across each fathometer trace are event marks corresponding to 32.8-ft (10-m) increments as displayed on the console for the Motorola Mini-Ranger III. Depth is recorded in feet referenced to lake level at the time of the survey. No transducer draft correction is needed because the fathometer trace already incorporates this correction.

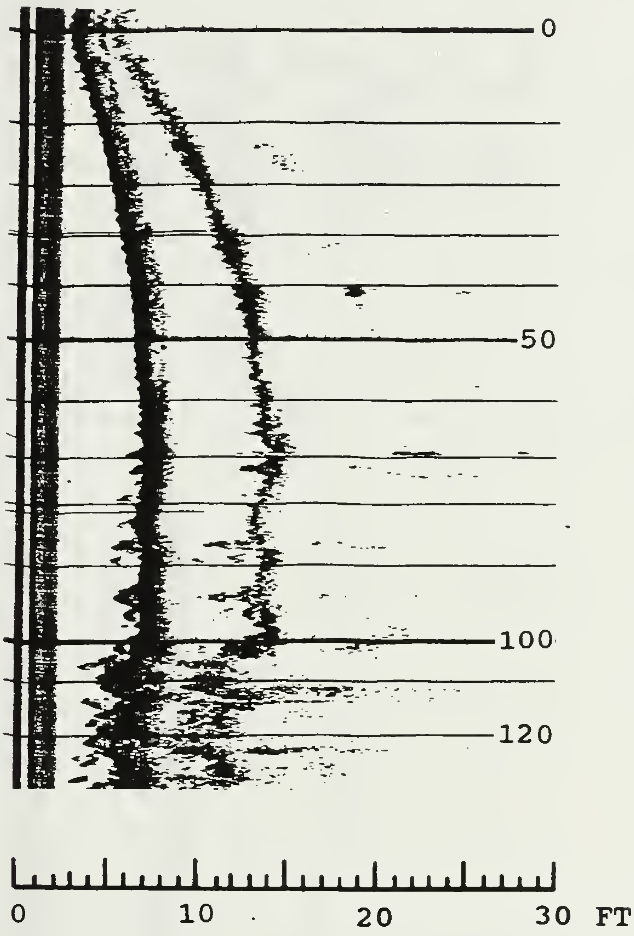
N6272
28 JUNE 1995

Start Time 0903 CST
Lake Level 2.45' LWD



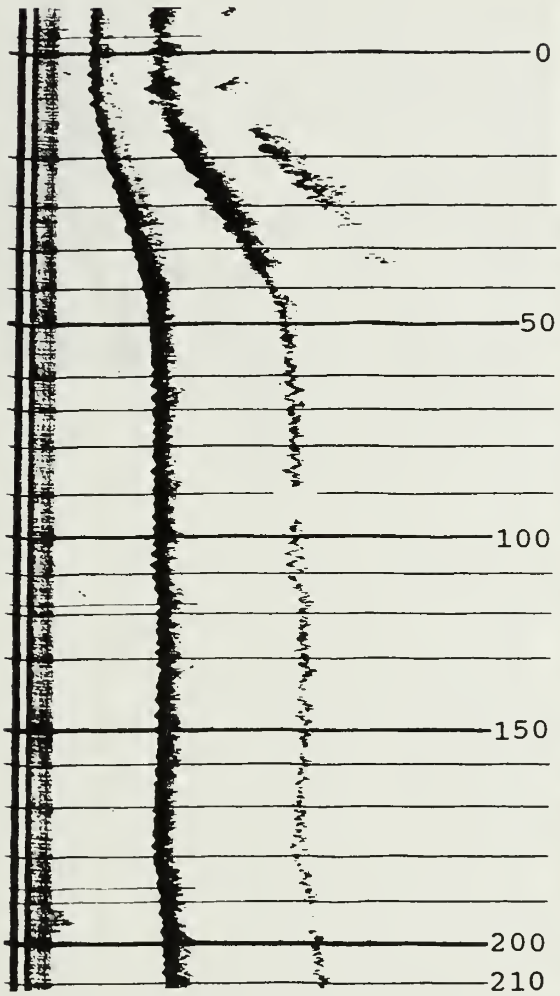
E2055
28 JUNE 1995

Start Time 0850 CST
Lake Level 2.43' LWD



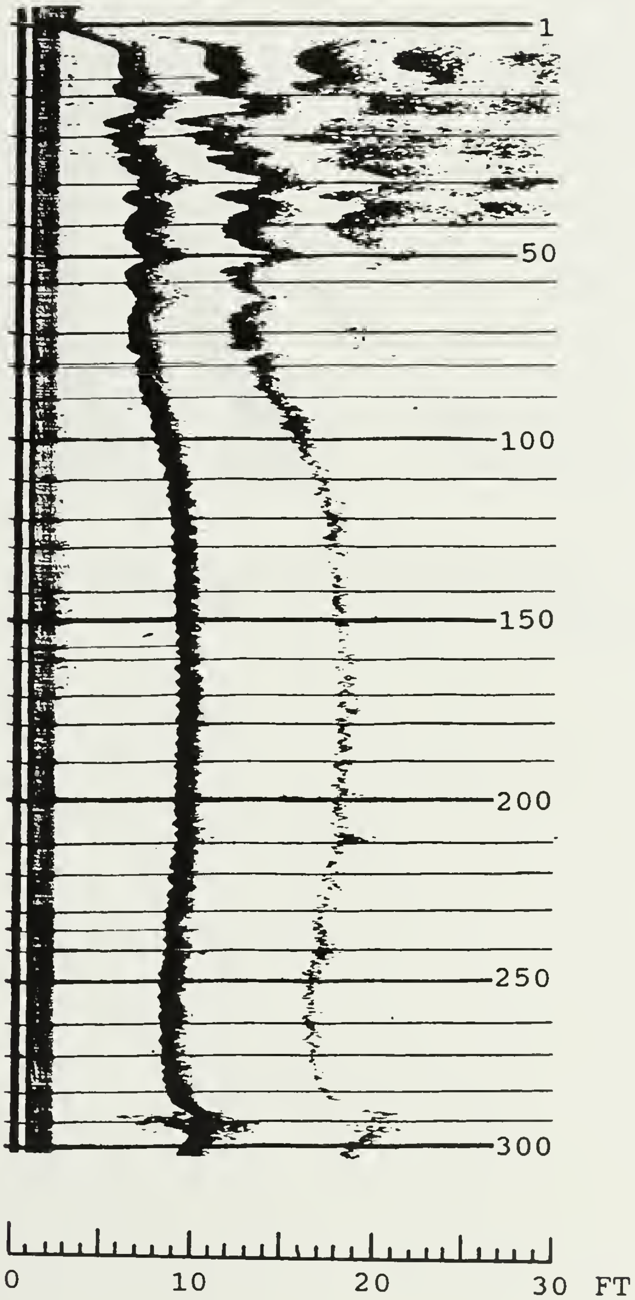
E2100
28 JUNE 1995

Start Time 0840 CST
Lake Level 2.42' LWD



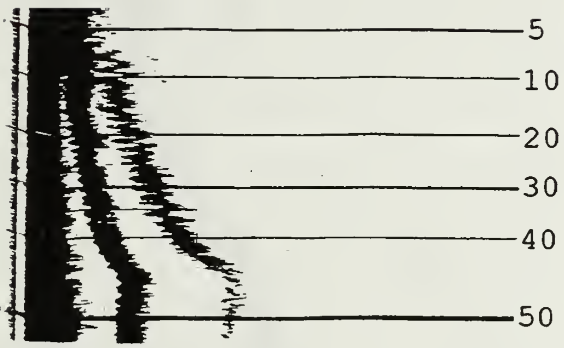
E2135
28 JUNE 1995

Start Time 0821 CST
Lake Level 2.39' LWD



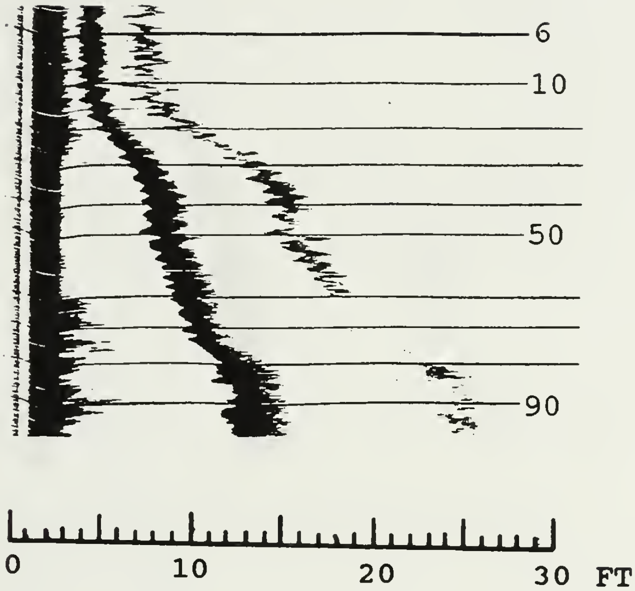
N6272
11 APRIL 1996

Start Time 1156 CST
Lake Level 1.30' LWD



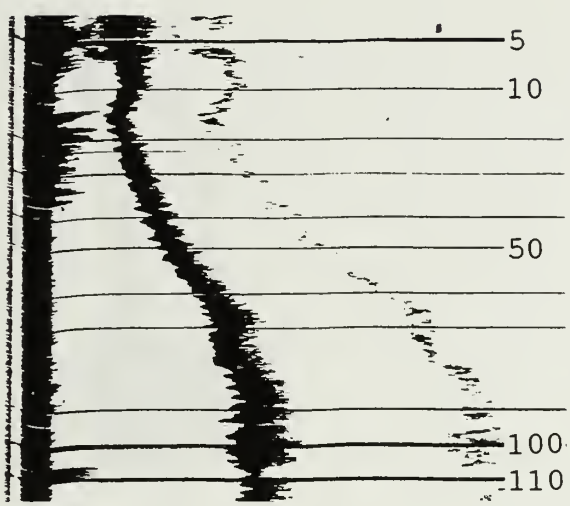
N6217
11 APRIL 1996

Start Time 1217 CST
Lake Level 1.30' LWD



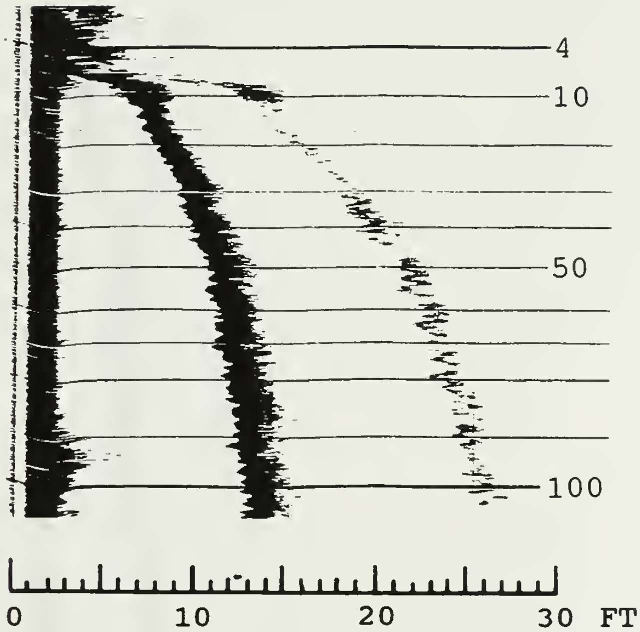
N6017
11 APRIL 1996

Start Time 1236 CST
Lake Level 1.36' LWD



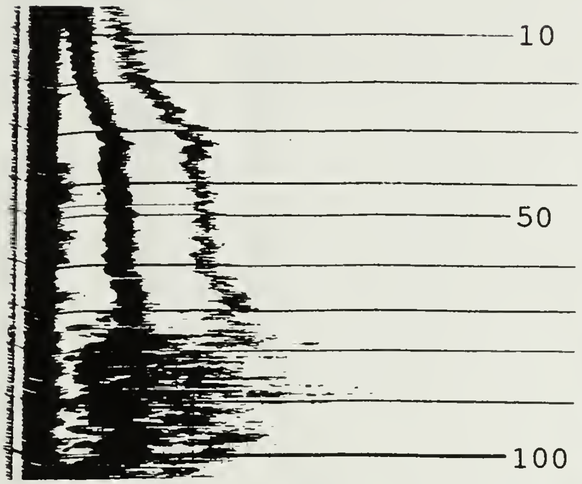
N5817
11 APRIL 1996

Start Time 1242 CST
Lake Level 1.34' LWD



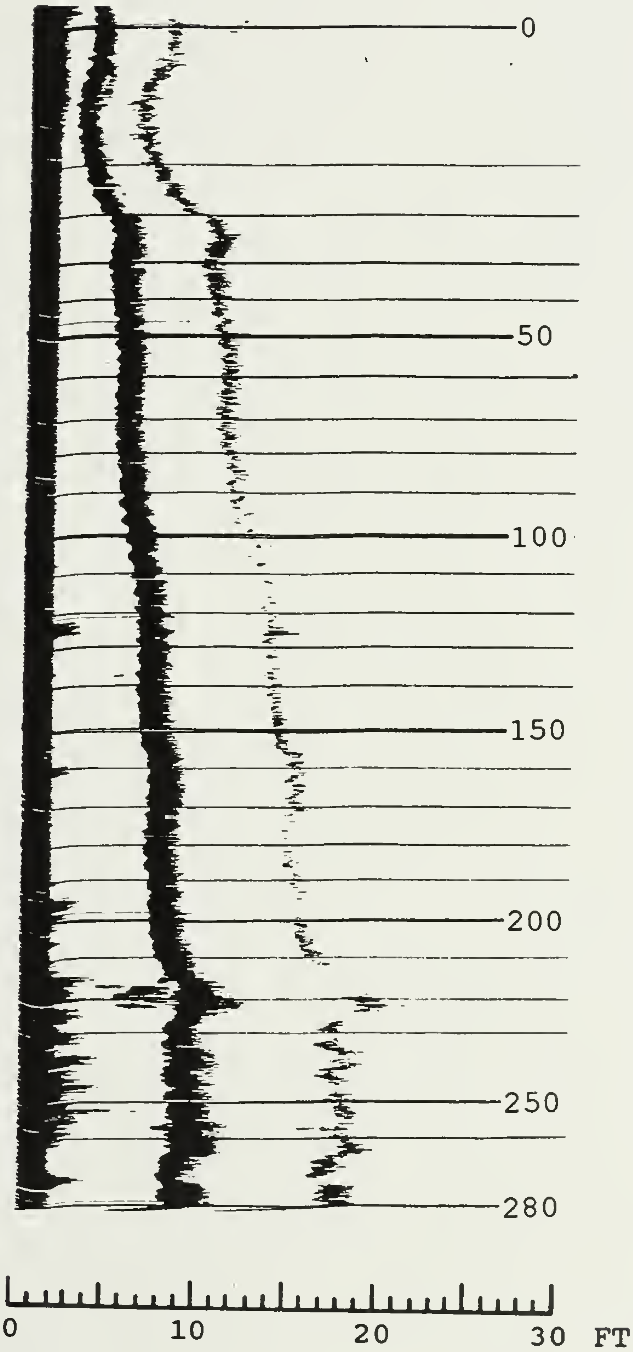
E2055
11 APRIL 1996

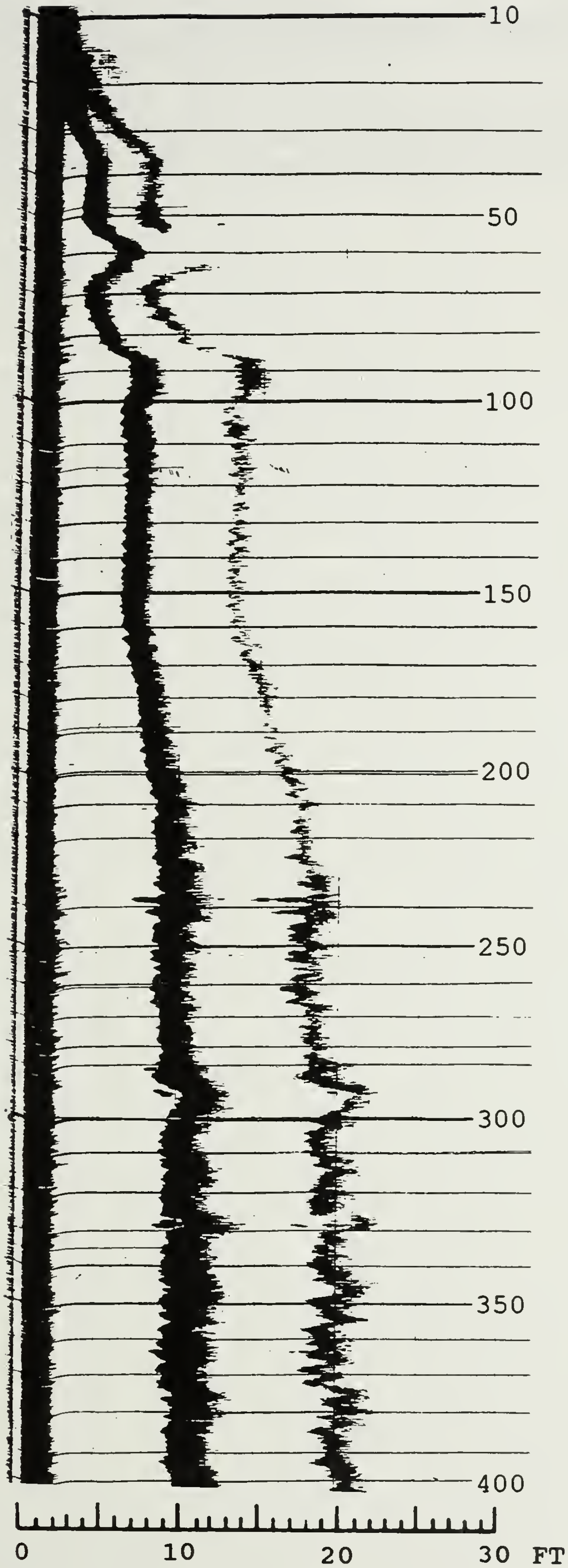
Start Time 1200 CST
Lake Level 1.30' LWD



E2100
11 APRIL 1996

Start Time 1145 CST
Lake Level 1.34' LWD





E2135
11 APRIL 1996

Start Time 1132 CST
Lake Level 1.38' LWD

APPENDIX G TABULAR DATA FOR ISGS 1995 AND 1996 PRISM-POLE AND FATHOMETER SURVEYS OF BOAT-LAUNCH BASIN

All data are referenced to the Lake Forest Datum (LFD) for an elevation reference, and to Low Water Datum (LWD) for a water-depth reference. These data cover only the boat-launch basin (1995) with an addition of three long lines south of the basin in April 1996.

LINE N6476

June 28, 1995

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034388.356	639325.457	4.945	7.005
2034387.507	639325.855	−5.265	−3.205
2034388.009	639326.189	−5.102	−3.042
2034390.743	639331.707	−5.469	−3.409
2034390.127	639331.982	−5.502	−3.442
2034393.547	639336.310	−5.781	−3.721
2034392.657	639337.114	−5.996	−3.936
2034395.260	639341.839	−6.203	−4.143
2034397.930	639344.400	−6.585	−4.525
2034396.745	639347.521	−7.153	−5.093
2034400.161	639353.715	−7.108	−5.048
2034402.759	639361.443	−6.975	−4.915
2034404.946	639369.008	−6.873	−4.813
2034408.894	639377.588	−6.216	−4.156
2034413.474	639390.823	−5.895	−3.835
2034418.475	639403.900	−5.543	−3.483
2034422.141	639413.318	−5.588	−3.528
2034424.665	639422.779	−5.757	−3.697
2034428.263	639432.553	−6.016	−3.956
2034432.259	639440.248	−6.092	−4.032
2034435.824	639453.045	−7.170	−5.110
2034439.671	639461.012	−5.873	−3.813
2034442.364	639470.672	−6.185	−4.125
2034445.479	639477.926	−5.971	−3.911
2034448.441	639485.493	−6.093	−4.033
2034449.933	639488.764	−4.722	−2.662
2034450.809	639491.871	−3.690	−1.630
2034453.276	639497.476	−1.386	0.674
2034454.412	639499.360	−1.356	0.704
2034455.040	639501.866	−1.931	0.129
2034455.433	639502.740	1.169	3.229
2034457.387	639507.364	3.041	5.101

LINE N6367

June 28, 1995

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034288.766	639367.247	4.909	6.969
2034288.260	639367.699	−3.569	−1.509
2034293.869	639381.570	−5.688	−3.628
2034297.152	639389.320	−6.086	−4.026
2034300.245	639397.161	−5.680	−3.620
2034302.975	639404.234	−6.751	−4.691
2034306.185	639411.528	−5.911	−3.851
2034309.535	639419.990	−6.450	−4.390
2034312.877	639426.862	−7.830	−5.770
2034314.644	639431.735	−7.744	−5.684
2034317.406	639437.573	−7.340	−5.280
2034320.153	639445.165	−7.979	−5.919
2034323.908	639454.460	−7.352	−5.292
2034324.398	639464.793	−8.035	−5.975
2034329.679	639472.738	−7.808	−5.748
2034330.990	639482.660	−6.561	−4.501
2034332.698	639482.530	−6.528	−4.468
2034334.250	639491.672	−6.984	−4.924
2034336.293	639491.535	−7.359	−5.299
2034339.441	639502.478	−5.334	−3.274
2034340.810	639503.594	−5.337	−3.277
2034343.563	639510.822	−5.543	−3.483
2034349.112	639515.162	−5.990	−3.930
2034346.457	639518.404	−5.922	−3.862
2034348.746	639526.486	−6.260	−4.200
2034351.556	639533.636	−6.335	−4.275
2034354.294	639540.632	−7.025	−4.965
2034357.381	639549.287	−5.506	−3.446
2034359.842	639555.863	−3.448	−1.388
2034361.888	639560.704	−3.199	−1.139
2034363.151	639563.320	1.198	3.258
2034365.540	639569.554	2.400	4.460

LINE N6317

June 28, 1995

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034280.963	639495.465	7.271	9.331
2034284.439	639505.714	1.309	3.369
2034287.964	639511.386	0.535	2.595
2034289.463	639522.607	−0.092	1.968
2034293.183	639527.114	0.000	2.060
2034301.116	639550.295	0.050	2.110
2034305.135	639557.945	0.483	2.543
2034308.473	639567.342	1.393	3.453
2034312.533	639576.475	1.631	3.691
2034315.310	639585.736	4.019	6.079

LINE N6272

June 28, 1995
Start/End Time: 903/905 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1998.788
Low Water Datum [LWD] Correction feet −2.45

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
8	2034210	639431	−2.8	−0.7
10	2034215	639446	−3.1	−1.0
15	2034221	639461	−4.1	−2.0
20	2034227	639477	−4.1	−2.0
25	2034233	639492	−4.4	−2.3
30	2034239	639507	−4.8	−2.7
35	2034245	639523	−6.1	−4.0
40	2034250	639538	−5.7	−3.6
45	2034256	639553	−6.5	−4.4
50	2034262	639569	−6.6	−4.5

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE E2055

June 28, 1995
Start/End Time: 850/853 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6303.495
Low Water Datum [LWD] Correction feet −2.42

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034460.001	639378.313	8.366	10.426
	2034447.390	639382.805	0.822	2.882
	2034440.272	639386.476	−4.698	−2.638
	2034431.525	639388.764	−5.306	−3.246
	2034426.115	639391.654	−5.801	−3.741
	2034418.487	639393.853	−6.563	−4.503
	2034411.858	639396.184	−5.678	−3.618
	2034404.959	639399.265	−5.624	−3.564
	2034398.688	639401.836	−5.983	−3.923
	2034390.039	639404.619	−7.340	−5.280
	2034381.142	639407.404	−7.441	−5.381
	2034371.525	639411.663	−7.425	−5.365
	2034366.598	639414.521	−7.021	−4.961
	2034364.730	639415.010	−7.094	−5.034
	2034356.916	639418.116	−6.643	−4.583
	2034349.850	639422.456	−6.691	−4.631
	2034341.276	639425.292	−7.853	−5.793
	2034331.883	639428.369	−8.203	−6.143
	2034322.699	639431.823	−7.401	−5.341
	2034315.661	639433.157	−7.729	−5.669
	2034305.892	639435.549	−7.039	−4.979
	2034291.700	639442.585	−6.746	−4.686
	2034285.587	639444.836	−5.636	−3.576
	2034282.575	639445.759	−5.450	−3.390
	2034271.433	639449.853	4.952	7.012
	2034263.209	639452.998	6.548	8.608
	2034254.390	639456.509	6.957	9.017
Fathometer Data				
0	2034238	639463	−3.1	−1.1
8	2034223	639468	−3.8	−1.8
10	2034207	639474	−4.3	−2.3
15	2034192	639480	−4.8	−2.8
20	2034177	639486	−4.9	−2.9
25	2034161	639492	−5.4	−3.4
30	2034146	639497	−5.6	−3.6
35	2034130	639503	−4.7	−2.7
40	2034115	639509	−4.8	−2.8
45	2034100	639515	−6.1	−4.1
50	2034084	639521	−6.3	−4.3
55	2034069	639527	−6.5	−4.5
60	2034054	639532	−6.5	−4.5
65	2034038	639538	−5.8	−3.8
70	2034023	639544	−6.6	−4.6
75	2034008	639550	−6.5	−4.5
80	2033992	639556	−6.3	−4.3
85	2033977	639561	−6.6	−4.6
90	2033962	639567	−6.6	−4.6
95	2033946	639573	−6.6	−4.6
100	2033931	639579	−6.1	−4.1

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE E2100

June 28, 1995
Start/End Time: 840/844 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6527.502
Low Water Datum [LWD] Correction feet -2.42

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034477.090	639419.723	6.386	8.446
	2034463.052	639424.240	0.885	2.945
	2034462.741	639425.234	−1.615	0.445
	2034457.292	639427.521	−4.175	−2.115
	2034452.902	639428.829	−5.563	−3.503
	2034443.144	639432.670	−6.310	−4.250
	2034433.248	639437.082	−5.878	−3.818
	2034424.303	639441.286	−6.544	−4.484
	2034420.972	639441.114	−3.622	−1.562
	2034403.934	639447.773	−2.310	−0.250
	2034396.583	639449.489	−3.353	−1.293
	2034389.457	639452.920	−3.186	−1.126
	2034381.136	639456.330	−3.829	−1.769
	2034375.770	639460.456	−7.563	−5.503
	2034374.756	639458.782	−4.182	−2.122
	2034370.438	639462.143	−7.355	−5.295
	2034366.004	639463.510	−5.739	−3.679
	2034360.137	639466.472	−6.124	−4.064
	2034354.451	639467.482	−5.925	−3.865
	2034349.581	639469.274	−6.926	−4.866
	2034340.963	639472.002	−6.479	−4.419
	2034334.279	639475.740	−6.643	−4.583
	2034328.111	639477.532	−5.693	−3.633
	2034320.238	639480.655	−7.191	−5.131
	2034315.884	639481.941	−5.898	−3.838
	2034311.926	639484.593	−5.372	−3.312
	2034303.033	639487.280	−5.783	−3.723
	2034298.207	639488.480	−5.961	−3.901
	2034291.137	639490.947	−7.196	−5.136
	2034279.442	639494.786	7.213	9.273
	2034271.884	639497.614	6.487	8.547
	2034269.025	639498.482	6.915	8.975
Fathometer Data				
0	2034254	639505	−3.7	−1.7
8	2034238	639510	−4.6	−2.6
10	2034223	639516	−5.0	−3.0
15	2034208	639522	−5.5	−3.5
20	2034192	639528	−5.7	−3.7
25	2034177	639534	−6.0	−4.0
30	2034162	639540	−6.4	−4.4
35	2034146	639545	−6.6	−4.6
40	2034131	639551	−6.9	−4.9
45	2034116	639557	−6.9	−4.9
50	2034100	639563	−7.1	−5.1
55	2034085	639569	−7.1	−5.1
60	2034070	639574	−7.4	−5.4
65	2034054	639580	−7.4	−5.4
70	2034039	639586	−7.4	−5.4
75	2034024	639592	−7.4	−5.4
80	2034008	639598	−7.4	−5.4
85	2033993	639604	−7.4	−5.4
90	2033978	639609	−7.5	−5.5
95	2033962	639615	−7.6	−5.6
100	2033947	639621	−7.2	−5.2
105	2033932	639627	−7.5	−5.5
110	2033916	639633	−7.5	−5.5
115	2033901	639638	−7.6	−5.6
120	2033886	639644	−7.7	−5.7
125	2033870	639650	−7.7	−5.7
130	2033855	639656	−7.8	−5.8
135	2033840	639662	−7.7	−5.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
140	2033824	639668	−7.8	−5.8
145	2033809	639673	−7.8	−5.8
150	2033794	639679	−7.8	−5.8
155	2033778	639685	−7.8	−5.8
160	2033763	639691	−7.6	−5.6
165	2033748	639697	−7.6	−5.6
170	2033732	639702	−7.6	−5.6
175	2033717	639708	−7.6	−5.6
180	2033702	639714	−7.8	−5.8
185	2033686	639720	−7.9	−5.9
190	2033671	639726	−8.1	−6.1
195	2033656	639732	−8.1	−6.1
200	2033640	639737	−8.1	−6.1
205	2033625	639743	−8.4	−6.4

1995 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE E2135

June 28, 1995
Start/End Time: 821/825 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6303.495
Low Water Datum [LWD] Correction feet −2.38

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034496.586	639450.281	7.081	9.141
	2034496.458	639450.010	7.074	9.134
	2034481.908	639455.634	4.618	6.678
Fathometer Data				
1	2034476	639458	−5.3	−3.2
8	2034460	639464	−5.2	−3.1
10	2034445	639470	−5.2	−3.1
15	2034430	639475	−4.7	−2.6
20	2034414	639481	−5.3	−3.2
25	2034399	639487	−6.4	−4.3
30	2034384	639493	−6.2	−4.1
35	2034368	639499	−5.8	−3.7
40	2034353	639504	−5.7	−3.6
45	2034338	639510	−6.7	−4.6
50	2034322	639516	−5.9	−3.8
55	2034307	639522	−5.8	−3.7
60	2034292	639528	−6.1	−4.0
65	2034276	639534	−5.9	−3.8
70	2034261	639539	−5.9	−3.8
75	2034246	639545	−6.4	−4.3
80	2034230	639551	−6.7	−4.6
85	2034215	639557	−6.8	−4.7
90	2034200	639563	−7.3	−5.2
95	2034184	639568	−7.6	−5.5
100	2034169	639574	−7.7	−5.6
105	2034154	639580	−8.0	−5.9
110	2034138	639586	−8.2	−6.1
115	2034123	639592	−8.6	−6.5
120	2034108	639598	−8.7	−6.6
125	2034092	639603	−8.5	−6.4
130	2034077	639609	−8.8	−6.7
135	2034062	639615	−8.7	−6.6
140	2034046	639621	−8.7	−6.6
145	2034031	639627	−8.7	−6.6
150	2034016	639632	−8.9	−6.8
155	2034000	639638	−8.9	−6.8
160	2033985	639644	−9.0	−6.9
165	2033970	639650	−8.7	−6.6
170	2033954	639656	−8.9	−6.8
175	2033939	639662	−8.9	−6.8
180	2033924	639667	−8.8	−6.7
185	2033908	639673	−8.9	−6.8
190	2033893	639679	−8.9	−6.8
195	2033878	639685	−8.6	−6.5
200	2033862	639691	−8.8	−6.7
205	2033847	639696	−8.9	−6.8
210	2033832	639702	−8.6	−6.5
215	2033816	639708	−8.7	−6.6
220	2033801	639714	−8.5	−6.4
225	2033785	639720	−8.3	−6.2
230	2033770	639726	−8.2	−6.1
235	2033755	639731	−8.1	−6.0
240	2033739	639737	−8.0	−5.9
245	2033724	639743	−7.9	−5.8
250	2033709	639749	−7.9	−5.8
255	2033693	639755	−7.9	−5.8
260	2033678	639760	−7.8	−5.7
265	2033663	639766	−8.0	−5.9
270	2033647	639772	−8.2	−6.1
275	2033632	639778	−8.4	−6.3
280	2033617	639784	−8.8	−6.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
285	2033601	639790	−8.7	−6.6
290	2033586	639795	−9.7	−7.6
295	2033571	639801	−9.3	−7.2

LINE N6476

April 11, 1996

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034391.169	639330.603	−5.692	−3.632
2034454.853	639502.059	−1.719	0.341
2034447.627	639483.964	−1.343	0.717
2034440.142	639467.993	−1.634	0.426
2034440.397	639453.325	−1.914	0.146
2034431.122	639436.682	−4.763	−2.703
2034428.896	639416.394	−5.292	−3.232
2034422.544	639398.861	−5.649	−3.589
2034409.385	639378.615	−5.910	−3.850
2034399.450	639360.000	−6.352	−4.292
2034408.363	639541.384	−2.480	−0.420
2034403.508	639520.534	−2.040	0.020
2034400.146	639510.221	−1.973	0.087
2034388.248	639484.234	−3.745	−1.685
2034379.699	639454.463	−5.850	−3.790
2034370.312	639428.491	−5.710	−3.650
2034361.507	639400.019	−6.538	−4.478
2034347.760	639377.863	−7.317	−5.257
2034341.478	639363.957	−7.003	−4.943
2034334.311	639348.638	−6.075	−4.015

LINE N6417

April 11, 1996

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034410.603	639552.015	3.164	5.224
2034334.371	639347.535	5.920	7.980
2034408.363	639541.384	−2.480	−0.420
2034403.508	639520.534	−2.040	0.020
2034400.146	639510.221	−1.973	0.087
2034388.248	639484.234	−3.745	−1.685
2034379.699	639454.463	−5.850	−3.790
2034370.312	639428.491	−5.710	−3.650
2034361.507	639400.019	−6.538	−4.478
2034347.759	639377.863	−7.317	−5.257
2034341.477	639363.957	−7.003	−4.943
2034334.310	639348.638	−6.075	−4.015

LINE N6367

April 11, 1996

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034362.705	639559.850	−3.182	−1.122
2034361.030	639542.809	−2.406	−0.346
2034354.638	639520.757	−3.745	−1.685
2034342.188	639496.311	−4.735	−2.675
2034333.307	639474.393	−5.255	−3.195
2034324.498	639449.294	−6.519	−4.459
2034313.248	639428.170	−7.017	−4.957
2034309.087	639406.115	−7.190	−5.130
2034297.621	639385.756	−6.136	−4.076
2034290.300	639368.062	−3.788	−1.728

LINE N6317

April 11, 1996

Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data			
2034308.602	639575.166	−4.956	−2.896
2034305.473	639557.939	−3.776	−1.716
2034298.796	639543.034	−3.936	−1.876
2034294.841	639532.331	−4.708	−2.648
2034290.785	639523.197	−8.149	−6.089
2034287.884	639508.379	−8.215	−6.155

LINE N6272

April 11, 1996
Start/End Time: 1156/1158 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 1998.752
Low Water Datum [LWD] Correction feet −1.30

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
10	2034219	639445	−3.3	−1.2
15	2034225	639460	−3.5	−1.4
20	2034231	639475	−3.8	−1.7
25	2034237	639491	−4.0	−1.9
30	2034242	639506	−4.4	−2.3
35	2034248	639521	−4.8	−2.7
40	2034254	639537	−5.3	−3.2
45	2034260	639552	−6.6	−4.5
50	2034266	639567	−6.5	−4.4

LINE N6217

April 11, 1996
Start/End Time: 1217/1219

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2000.674
Low Water Datum [LWD] Correction feet −1.30

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
6	2034160	639455	−4.5	−2.4
10	2034165	639467	−4.1	−2.0
15	2034171	639483	−4.5	−2.4
20	2034176	639498	−5.3	−3.2
25	2034182	639513	−5.9	−3.8
30	2034188	639529	−6.8	−4.7
35	2034194	639544	−7.5	−5.4
40	2034200	639559	−7.7	−5.6
45	2034205	639575	−7.8	−5.7
50	2034211	639590	−8.0	−5.9
55	2034217	639605	−8.8	−6.7
60	2034223	639621	−9.3	−7.2
65	2034229	639636	−9.7	−7.6
70	2034235	639651	−10.1	−8.0
75	2034240	639667	−10.8	−8.7
80	2034246	639682	−11.7	−9.6
85	2034252	639697	−12.1	−10.0
90	2034258	639713	−12.6	−10.5

LINE N6017

April 11, 1996
Start/End Time: 1236/1238 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2007.847
Low Water Datum [LWD] Correction feet −1.36

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
5	2033974	639530	−3.9	−1.8
10	2033980	639545	−6.6	−4.5
15	2033986	639560	−6.0	−3.9
20	2033992	639576	−6.3	−4.2
25	2033998	639591	−6.6	−4.5
30	2034004	639606	−6.8	−4.7
35	2034009	639622	−7.6	−5.5
40	2034015	639637	−8.2	−6.1
45	2034021	639652	−8.6	−6.5
50	2034027	639668	−9.0	−6.9
55	2034033	639683	−9.7	−7.6
60	2034038	639698	−10.7	−8.6
65	2034044	639714	−11.2	−9.1
70	2034050	639729	−11.7	−9.6
75	2034056	639744	−11.9	−9.8
80	2034062	639760	−12.5	−10.4
85	2034068	639775	−13.0	−10.9
90	2034073	639790	−13.2	−11.1

LINE N5817

April 11, 1996
Start/End Time: 1242/1243 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 2019.28
Low Water Datum [LWD] Correction feet −1.34

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Fathometer Data				
5	2033791	639611	−3.7	−1.7
10	2033797	639627	−6.7	−4.7
15	2033803	639642	−7.5	−5.5
20	2033809	639657	−8.3	−6.3
25	2033815	639673	−9.1	−7.1
30	2033821	639688	−9.6	−7.6
35	2033826	639703	−9.9	−7.9
40	2033832	639719	−10.3	−8.3
45	2033838	639734	−10.7	−8.7
50	2033844	639749	−11.2	−9.2
55	2033850	639765	−11.4	−9.4
60	2033855	639780	−11.7	−9.7
65	2033861	639795	−11.8	−9.8
70	2033867	639811	−12.0	−10.0
75	2033873	639826	−12.2	−10.2
80	2033879	639841	−12.5	−10.5
85	2033885	639857	−12.6	−10.6
90	2033890	639872	−12.7	−10.7
95	2033896	639887	−12.9	−10.9
100	2033902	639903	−13.1	−11.1

LINE E2055

April 11, 1996
Start/End Time: 1200/1204 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6304.63
Low Water Datum [LWD] Correction feet −1.30

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034443.011	639384.467	−4.202	−2.142
	2034427.376	639392.810	−5.545	−3.485
	2034410.294	639398.687	−5.364	−3.304
	2034392.559	639406.221	−6.438	−4.378
	2034377.657	639412.421	−6.493	−4.433
	2034365.480	639415.960	−6.687	−4.627
	2034347.912	639422.804	−6.588	−4.528
	2034328.924	639429.624	−7.116	−5.056
	2034311.665	639437.220	−7.349	−5.289
	2034291.084	639441.857	−6.381	−4.321
	2034283.196	639445.877	−5.378	−3.318
	2034271.786	639450.661	−2.127	−0.067
Fathometer Data				
10	2034224	639468	−3.8	−1.7
15	2034208	639474	−3.8	−1.7
20	2034193	639480	−4.1	−2.0
25	2034178	639485	−4.6	−2.5
30	2034162	639491	−5.4	−3.3
35	2034147	639497	−5.5	−3.4
40	2034132	639503	−5.6	−3.5
45	2034116	639509	−5.7	−3.6
50	2034101	639515	−5.8	−3.7
55	2034086	639520	−5.8	−3.7
60	2034070	639526	−5.8	−3.7
65	2034055	639532	−6.1	−4.0
70	2034040	639538	−6.3	−4.2

1996 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE E2100

April 11, 1996
Start/End Time: 1145/1150 CST

MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6316.699
Low Water Datum [LWD] Correction feet −1.34

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034462.401	639425.072	−0.810	1.250
	2034447.615	639431.505	−2.834	−0.774
	2034435.238	639435.977	−4.588	−2.528
	2034421.842	639440.964	−4.819	−2.759
	2034403.397	639449.703	−4.936	−2.876
	2034384.531	639456.443	−5.678	−3.618
	2034362.485	639465.864	−5.660	−3.600
	2034339.043	639474.667	−5.388	−3.328
	2034318.018	639481.058	−4.224	−2.164
	2034305.387	639486.237	−5.678	−3.618
	2034296.237	639491.402	−9.045	−6.985
Fathometer Data				
5	2034266	639500	−4.0	−2.0
10	2034251	639506	−4.4	−2.4
15	2034235	639512	−4.7	−2.7
20	2034220	639517	−5.5	−3.5
25	2034205	639523	−6.0	−4.0
30	2034189	639529	−5.7	−3.7
35	2034174	639535	−5.8	−3.8
40	2034159	639541	−6.0	−4.0
45	2034143	639547	−6.0	−4.0
50	2034128	639552	−6.3	−4.3
55	2034113	639558	−6.3	−4.3
60	2034097	639564	−6.3	−4.3
65	2034082	639570	−6.2	−4.2
70	2034067	639576	−6.2	−4.2
75	2034051	639581	−6.2	−4.2
80	2034036	639587	−6.2	−4.2
85	2034021	639593	−6.3	−4.3
90	2034005	639599	−6.6	−4.6
95	2033990	639605	−6.7	−4.7
100	2033975	639611	−6.9	−4.9
105	2033959	639616	−7.0	−5.0
110	2033944	639622	−7.3	−5.3
115	2033929	639628	−7.5	−5.5
120	2033913	639634	−7.5	−5.5
125	2033898	639640	−7.6	−5.6
130	2033883	639645	−7.6	−5.6
135	2033867	639651	−7.6	−5.6
140	2033852	639657	−7.6	−5.6
145	2033837	639663	−7.6	−5.6
150	2033821	639669	−7.7	−5.7
155	2033806	639675	−7.9	−5.9
160	2033791	639680	−8.3	−6.3
165	2033775	639686	−8.2	−6.2
170	2033760	639692	−8.0	−6.0
175	2033745	639698	−8.1	−6.1
180	2033729	639704	−8.2	−6.2
185	2033714	639709	−8.2	−6.2
190	2033699	639715	−8.2	−6.2
195	2033683	639721	−8.2	−6.2
200	2033668	639727	−8.4	−6.4
205	2033653	639733	−8.5	−6.5
210	2033637	639739	−8.7	−6.7
215	2033622	639744	−9.2	−7.2
220	2033607	639750	−9.6	−7.6
225	2033591	639756	−9.6	−7.6
230	2033576	639762	−9.4	−7.4
235	2033561	639768	−9.2	−7.2
240	2033545	639773	−9.2	−7.2
245	2033530	639779	−9.2	−7.2
250	2033515	639785	−9.4	−7.4
255	2033499	639791	−9.4	−7.4
260	2033484	639797	−9.4	−7.4
265	2033469	639803	−9.4	−7.4
270	2033453	639808	−8.9	−6.9
275	2033438	639814	−8.9	−6.9
280	2033423	639820	−8.9	−6.9

1996 FOREST PARK BEACH BATHYMETRIC DATA
Illinois State Geological Survey

LINE E2135

April 11, 1996
Start/End Time: 1132/1139 CST

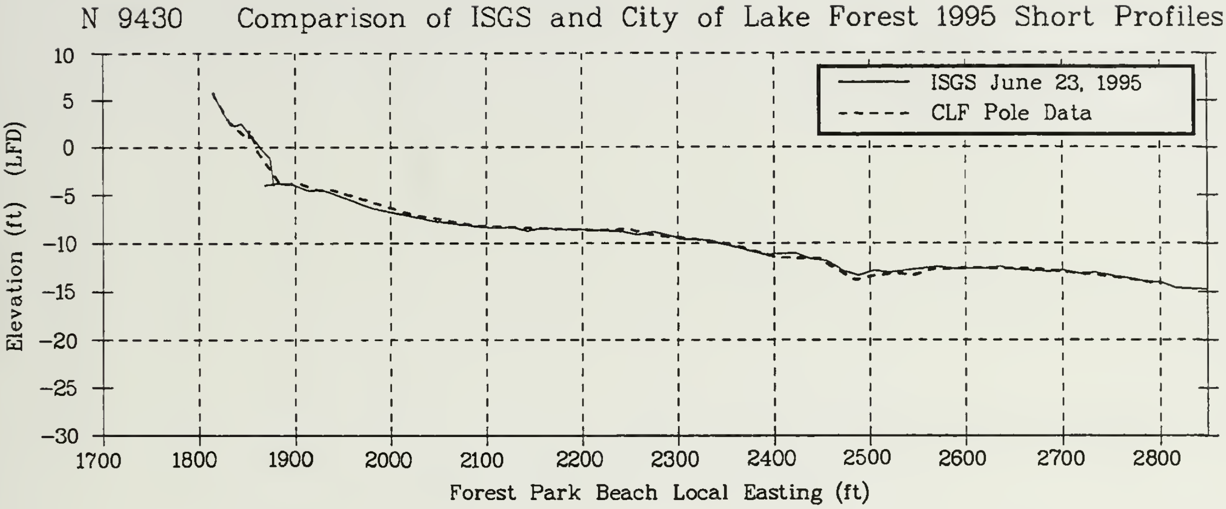
MiniRanger (MR) Easting:
Lake Forest Coordinates [LFC] feet 6527.596
Low Water Datum [LWD] Correction feet −1.38

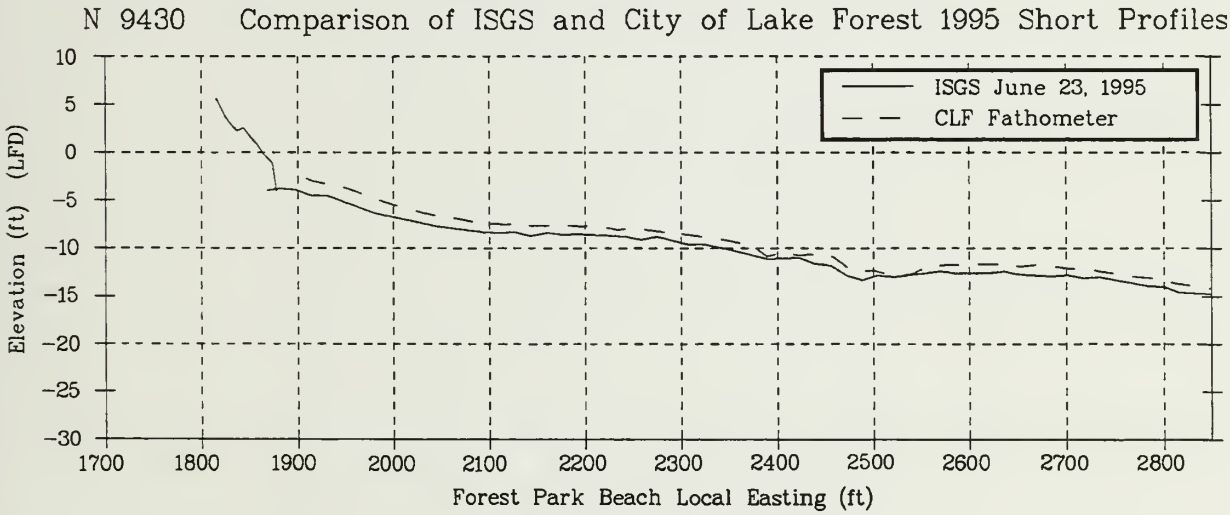
MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2034456.940	639463.901	−0.954	1.106
	2034461.759	639463.540	−0.005	2.055
	2034465.570	639462.044	0.484	2.544
	2034472.027	639459.207	0.409	2.469
	2034479.104	639456.419	1.192	3.252
Fathometer Data				
25	2034414	639481	−3.0	−0.9
30	2034399	639487	−3.5	−1.4
35	2034384	639493	−4.2	−2.1
40	2034368	639499	−4.4	−2.3
45	2034353	639504	−4.3	−2.2
50	2034338	639510	−4.2	−2.1
55	2034322	639516	−4.7	−2.6
60	2034307	639522	−6.4	−4.3
65	2034292	639528	−5.7	−3.6
70	2034276	639534	−4.6	−2.5
75	2034261	639539	−4.8	−2.7
80	2034246	639545	−5.4	−3.3
85	2034230	639551	−6.0	−3.9
90	2034215	639557	−7.4	−5.3
95	2034200	639563	−7.5	−5.4
100	2034184	639568	−7.0	−4.9
105	2034169	639574	−6.9	−4.8
110	2034154	639580	−6.9	−4.8
115	2034138	639586	−7.2	−5.1
120	2034123	639592	−7.2	−5.1
125	2034108	639598	−7.3	−5.2
130	2034092	639603	−7.2	−5.1
135	2034077	639609	−7.2	−5.1
140	2034062	639615	−7.2	−5.1
145	2034046	639621	−7.1	−5.0
150	2034031	639627	−7.0	−4.9
155	2034016	639632	−6.9	−4.8
160	2034000	639638	−7.2	−5.1
165	2033985	639644	−7.4	−5.3
170	2033970	639650	−7.7	−5.6
175	2033954	639656	−7.8	−5.7
180	2033939	639662	−8.1	−6.0
185	2033924	639667	−8.2	−6.1
190	2033908	639673	−8.5	−6.4
195	2033893	639679	−8.6	−6.5
200	2033878	639685	−8.7	−6.6
205	2033862	639691	−9.0	−6.9
210	2033847	639696	−9.5	−7.4
215	2033832	639702	−9.2	−7.1
220	2033816	639708	−9.3	−7.2
225	2033801	639714	−9.2	−7.1
230	2033786	639720	−9.4	−7.3
235	2033770	639726	−9.4	−7.3
240	2033755	639731	−9.4	−7.3
245	2033740	639737	−9.4	−7.3
250	2033724	639743	−9.4	−7.3
255	2033709	639749	−9.4	−7.3
260	2033694	639755	−9.2	−7.1
265	2033678	639760	−9.4	−7.3
270	2033663	639766	−9.7	−7.6
275	2033648	639772	−9.7	−7.6
280	2033632	639778	−9.8	−7.7
285	2033617	639784	−9.5	−7.4
290	2033602	639790	−10.2	−8.1
295	2033586	639795	−10.8	−8.7

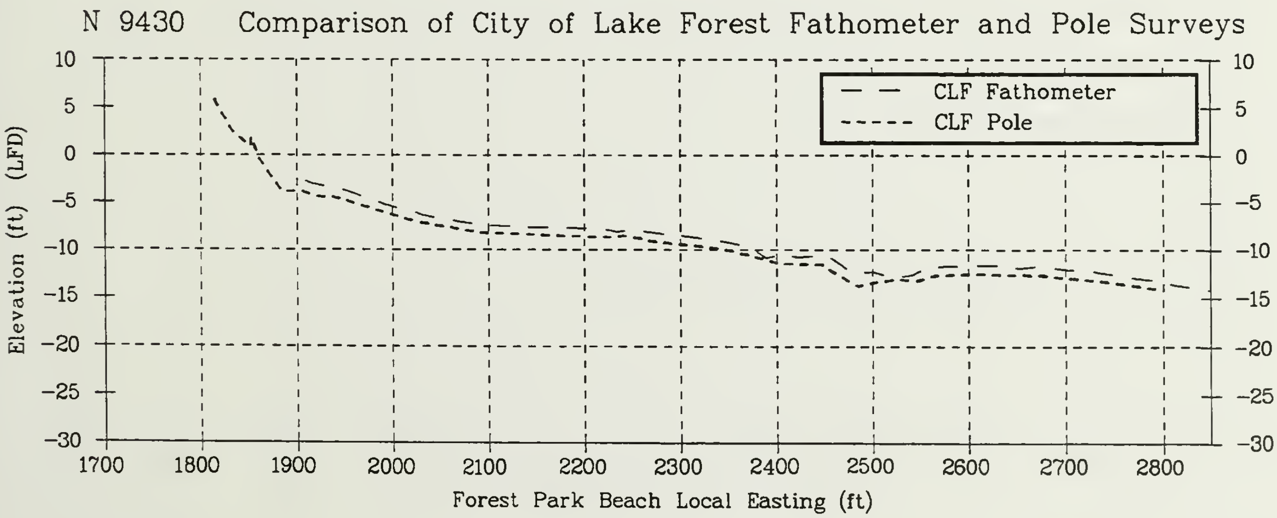
MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
300	2033571	639801	−10.0	−7.9
305	2033556	639807	−9.8	−7.7
310	2033540	639813	−9.8	−7.7
315	2033525	639819	−10.0	−7.9
320	2033510	639824	−9.9	−7.8
325	2033494	639830	−10.0	−7.9
330	2033479	639836	−10.3	−8.2
335	2033463	639842	−10.1	−8.0
340	2033448	639848	−9.9	−7.8
345	2033433	639854	−10.0	−7.9
350	2033417	639859	−10.0	−7.9
355	2033402	639865	−10.2	−8.1
360	2033387	639871	−9.9	−7.8
365	2033371	639877	−9.8	−7.7
370	2033356	639883	−10.0	−7.9
375	2033341	639888	−10.2	−8.1
380	2033325	639894	−10.5	−8.4
385	2033310	639900	−10.2	−8.1
390	2033295	639906	−10.5	−8.4
395	2033279	639912	−10.2	−8.1
400	2033264	639918	−10.7	−8.6

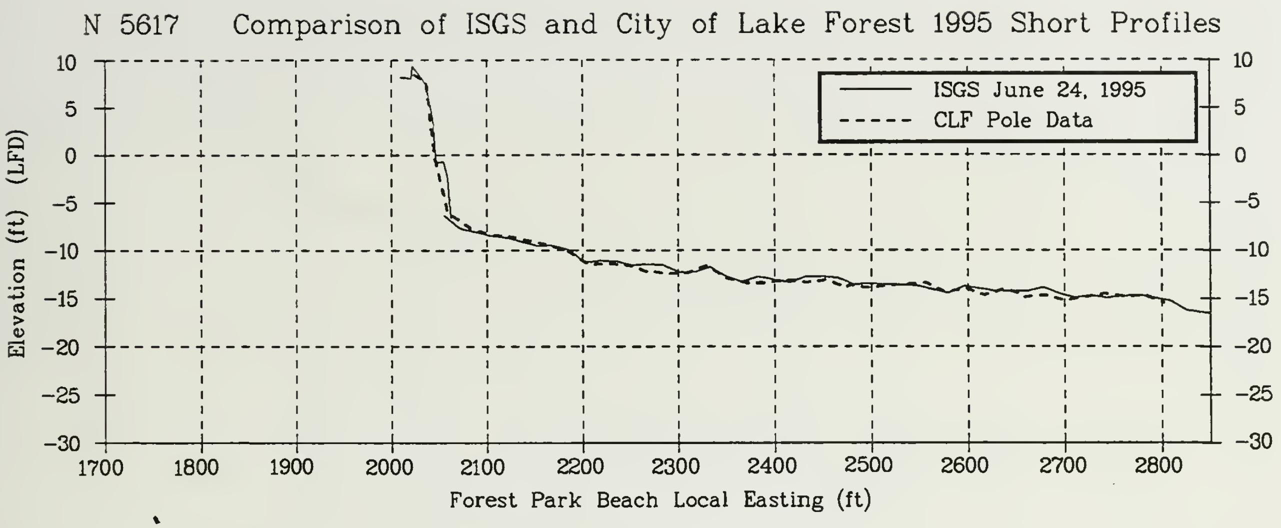
APPENDIX H COMPARISON OF ISGS AND CITY OF LAKE FOREST 1995 PRISM-POLE AND FATHOMETER PROFILES

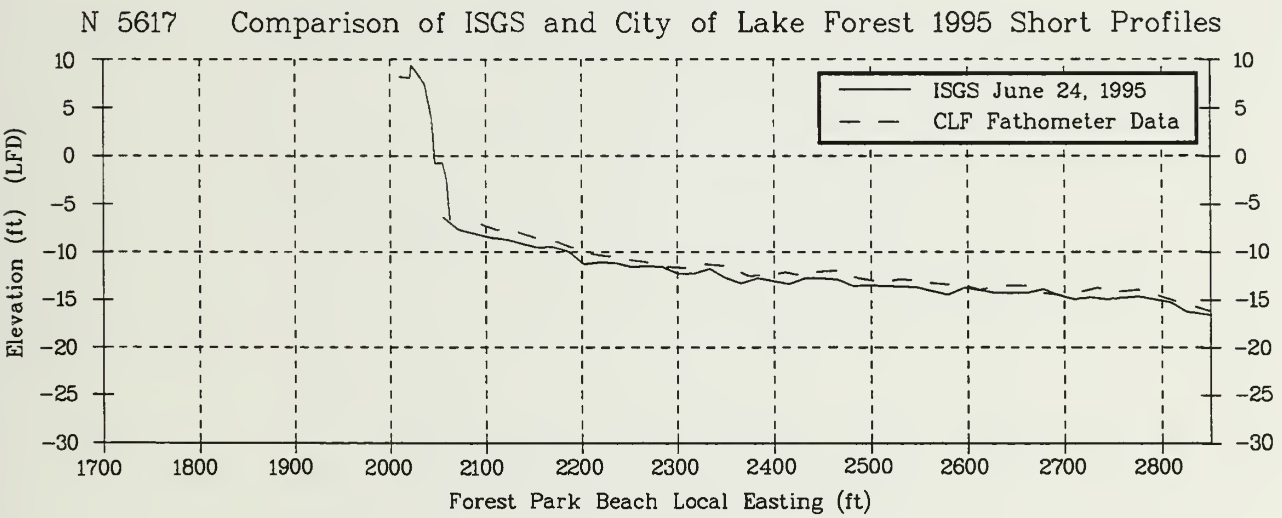
These profiles compare the ISGS prism-pole and fathometer data with the City of Lake Forest prism-pole and fathometer data. The vertical error in the City's fathometer data can be seen by comparison with both the ISGS fathometer data and the City's prism-pole data.

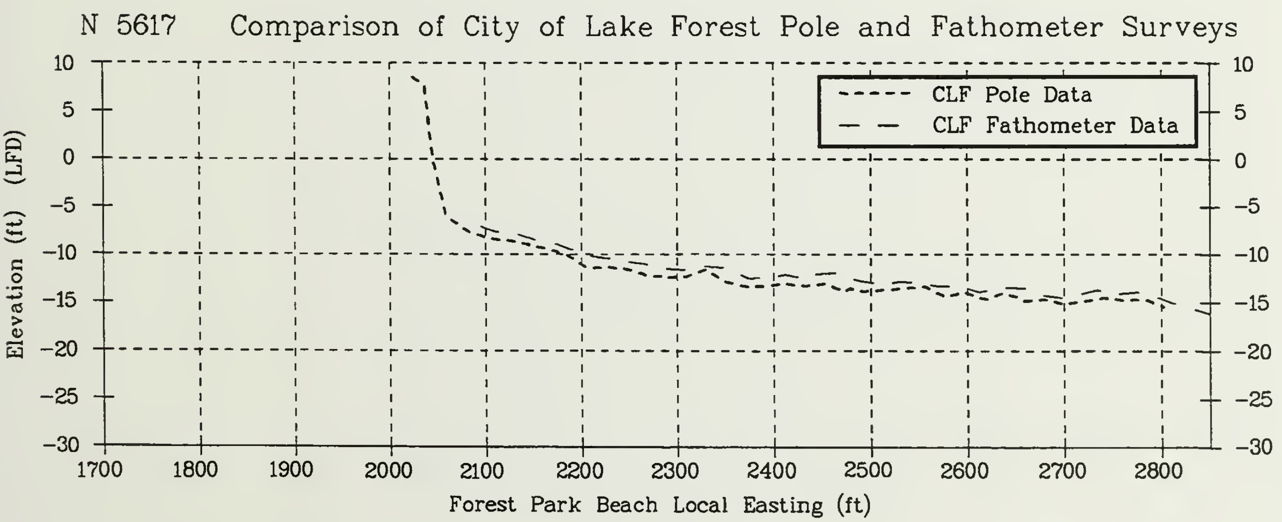

N 9430 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
CLF Pole Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

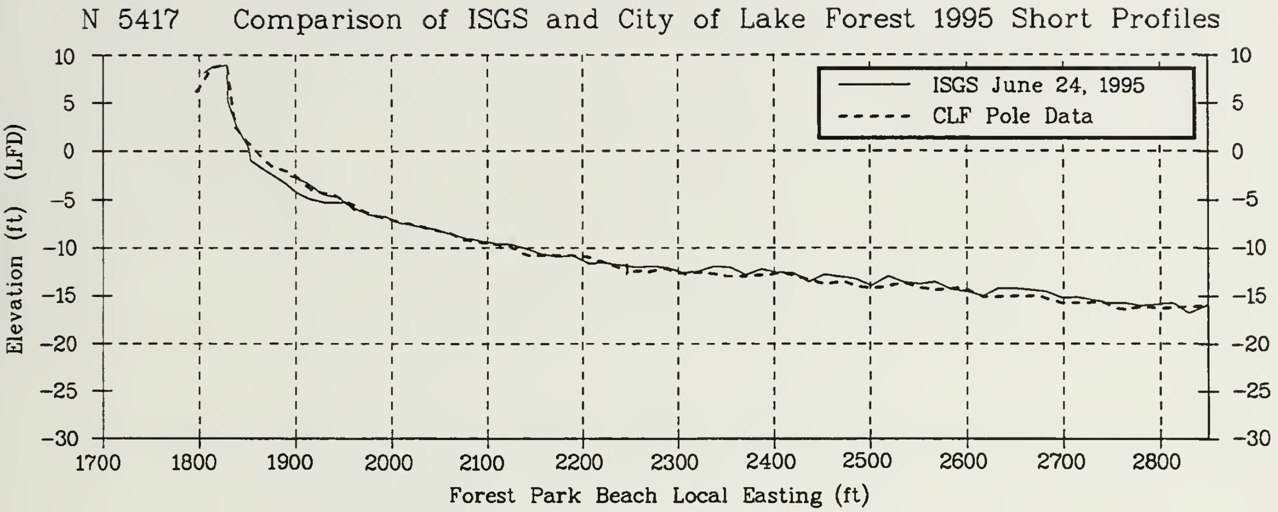

N 9430 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 23, 1995
CLF Fathometer
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

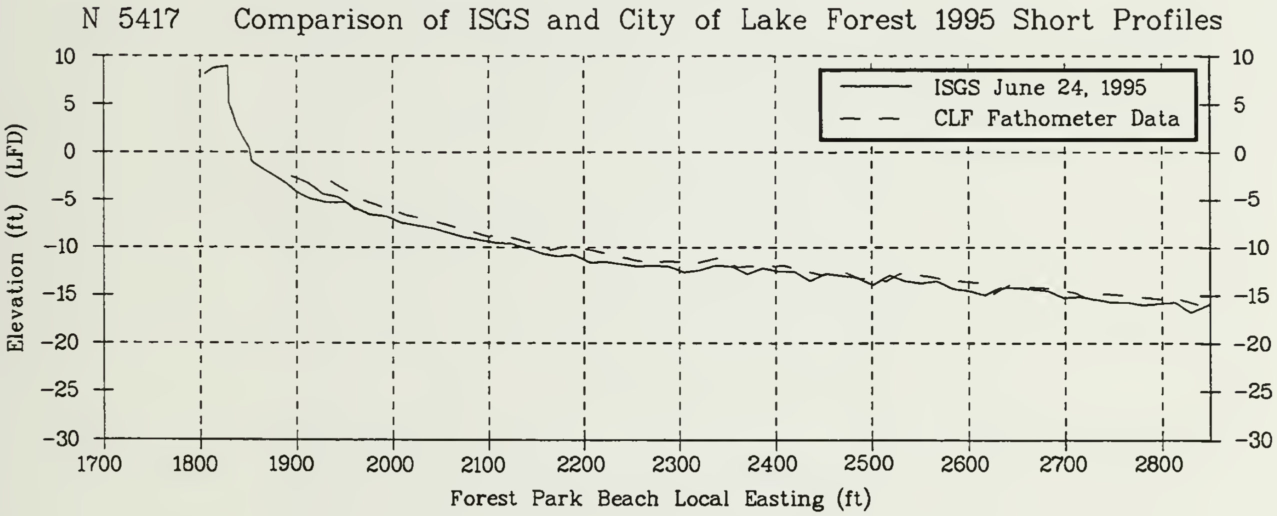

N 9430 Comparison of City of Lake Forest Fathometer and Pole Surveys
CLF Fathometer
CLF Pole
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

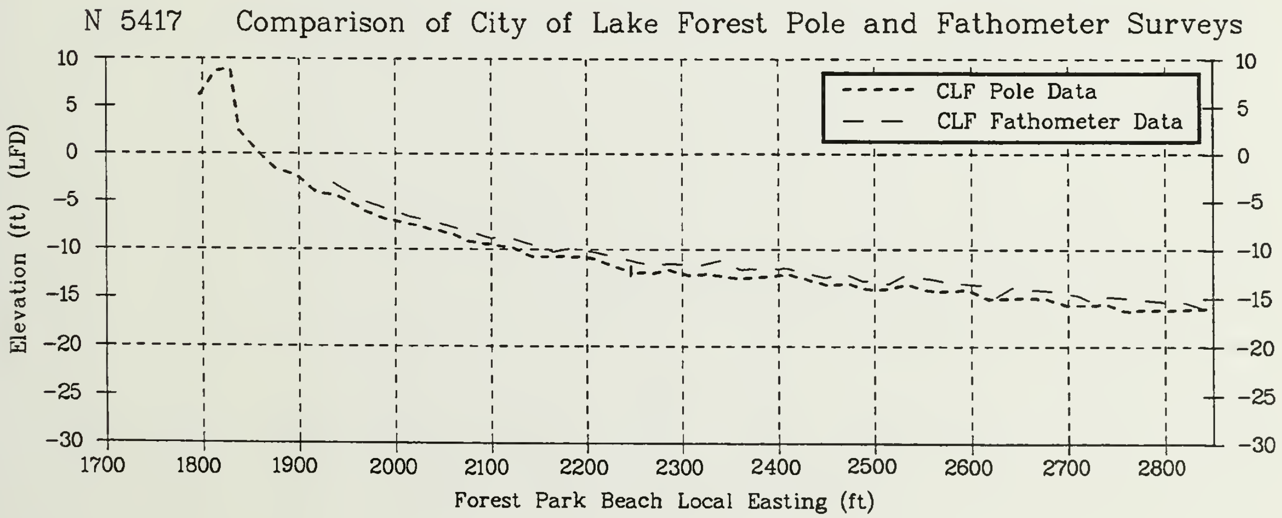

N 5617 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Pole Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

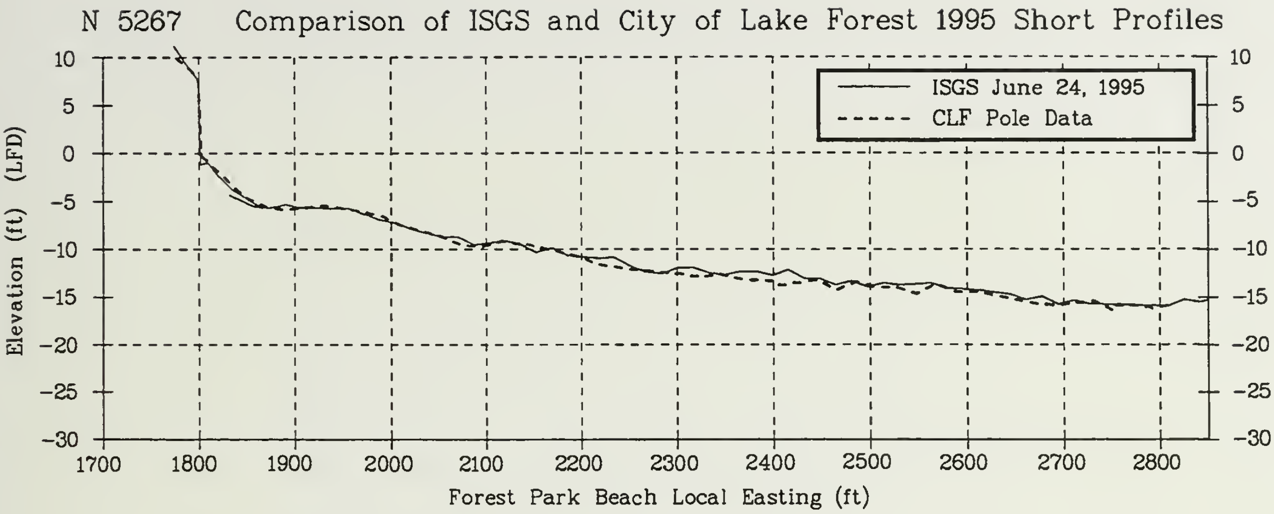

N 5617 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

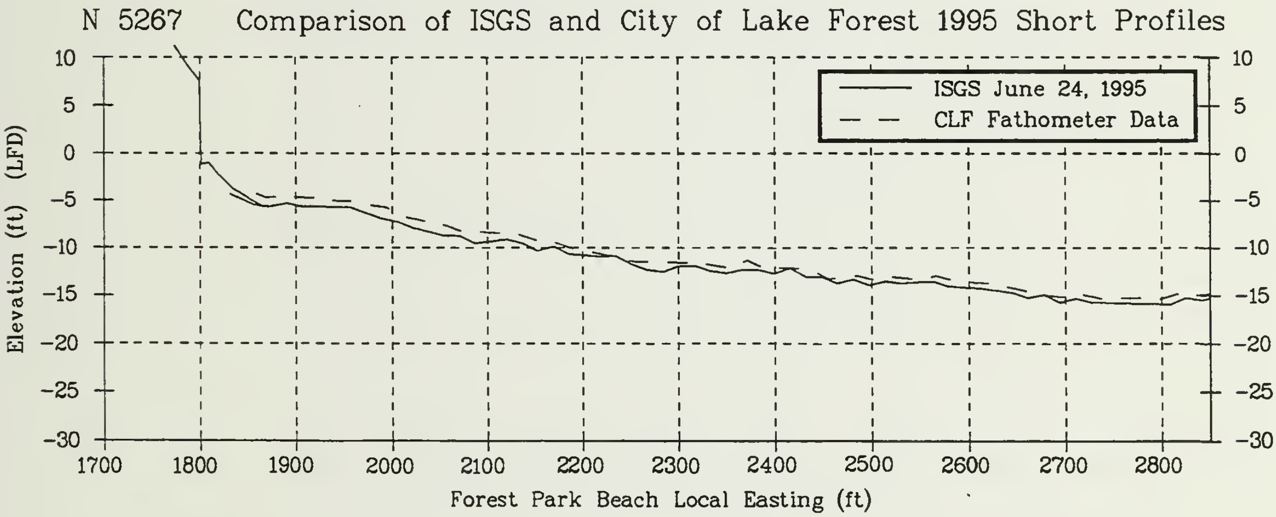

N 5617 Comparison of City of Lake Forest Pole and Fathometer Surveys
CLF Pole Data
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

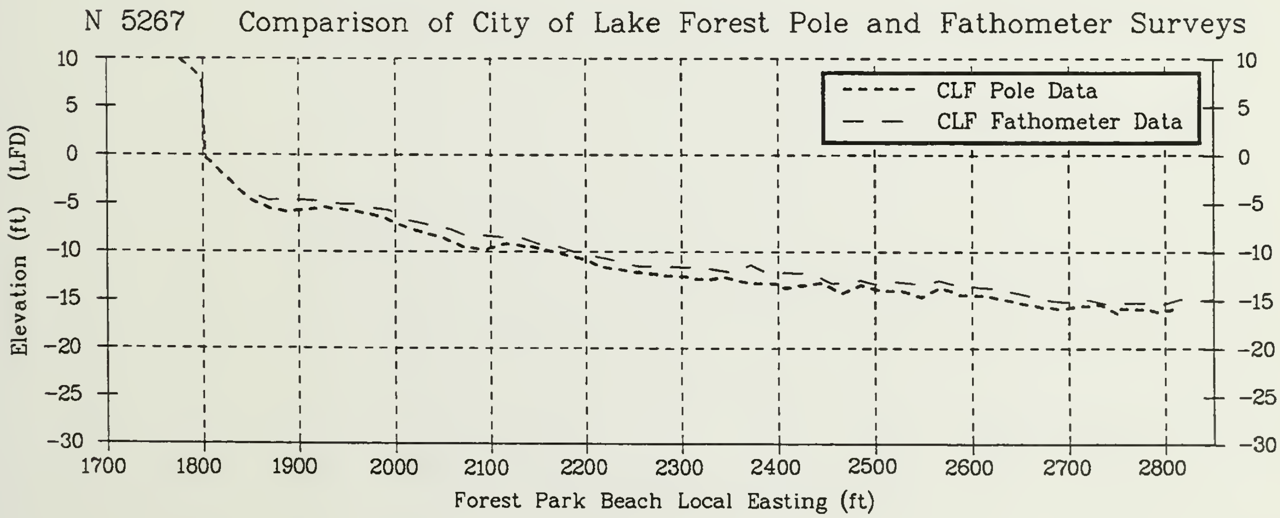

N 5417 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Pole Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800


N 5417 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

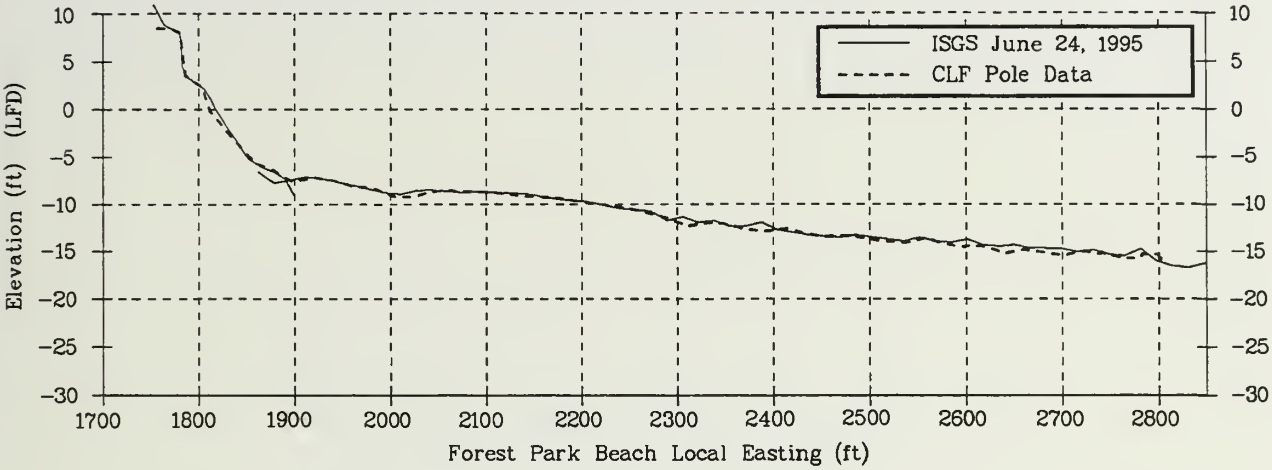

N 5417 Comparison of City of Lake Forest Pole and Fathometer Surveys
CLF Pole Data
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)
10
5
0
-5
-10
-15
-20
-25
-30
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800


N 5267 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Pole Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

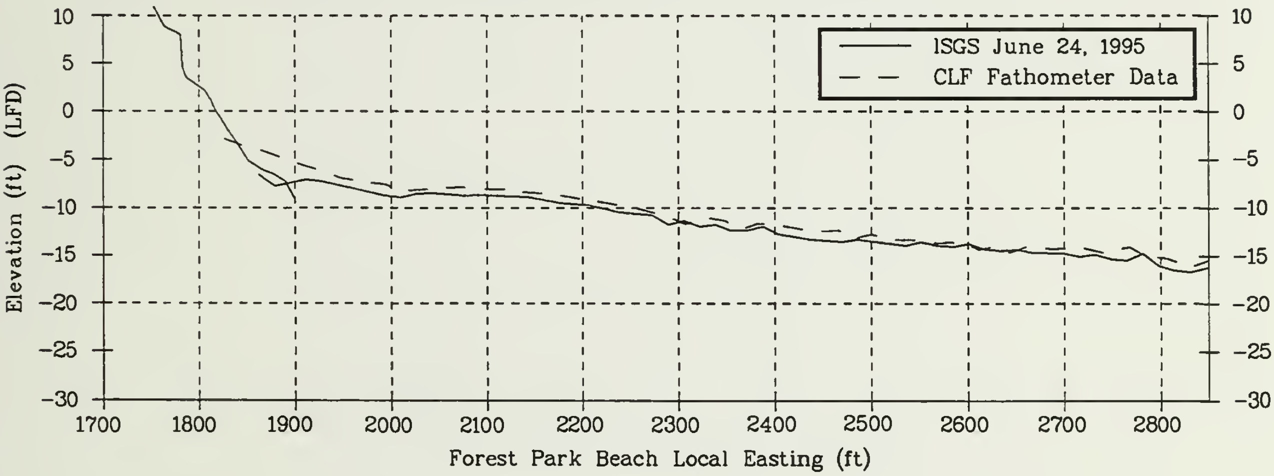

N 5267 Comparison of ISGS and City of Lake Forest 1995 Short Profiles
ISGS June 24, 1995
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)


N 5267 Comparison of City of Lake Forest Pole and Fathometer Surveys
CLF Pole Data
CLF Fathometer Data
Elevation (ft) (LFD)
Forest Park Beach Local Easting (ft)

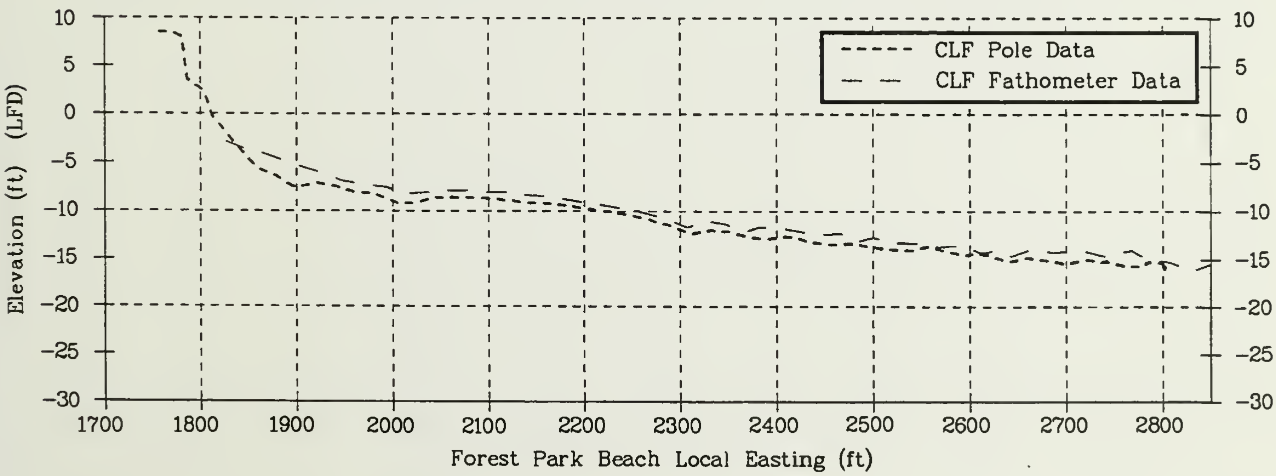
N 5067 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



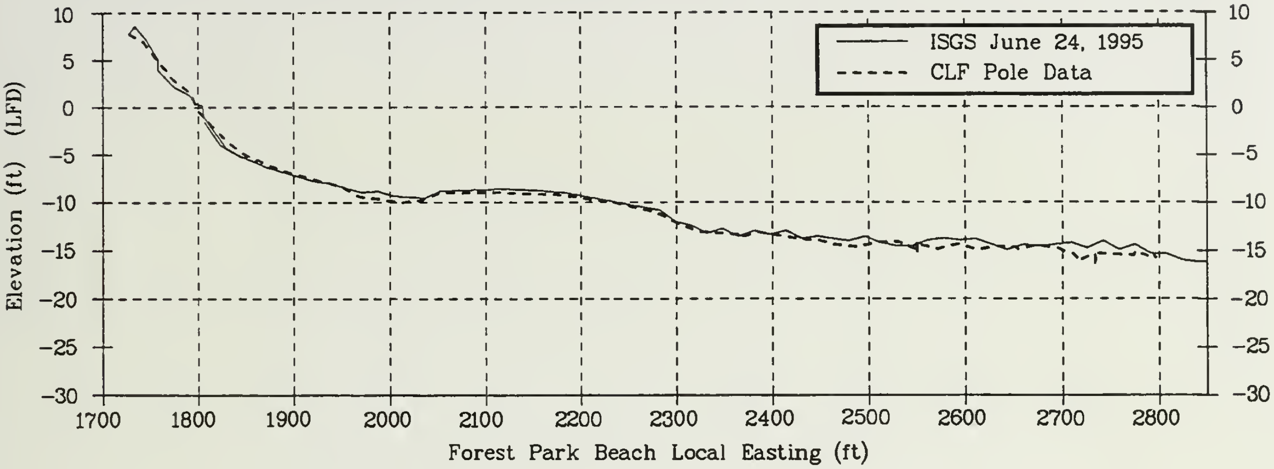
N 5067 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



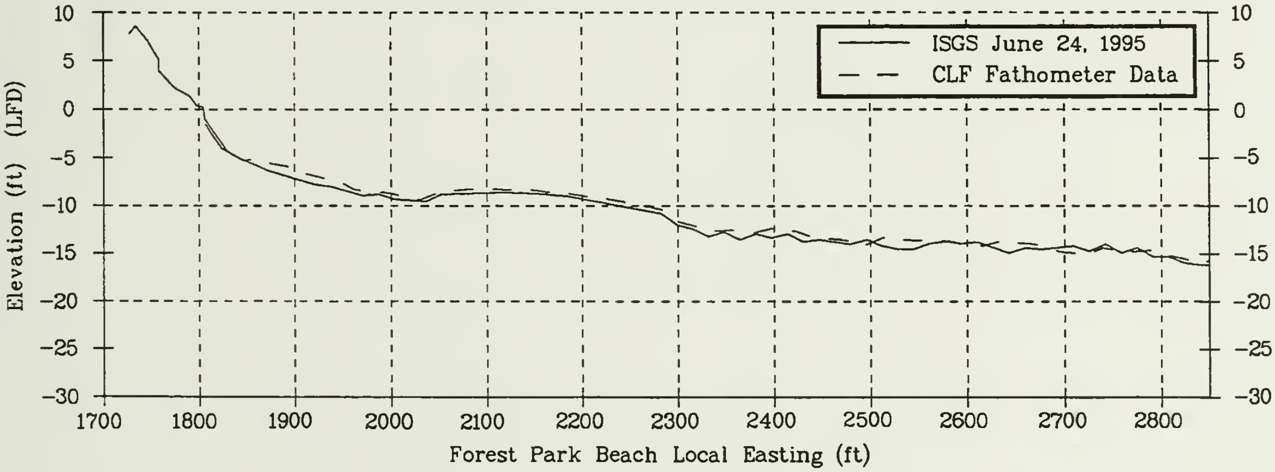
N 5067 Comparison of City of Lake Forest Pole and Fathometer Surveys



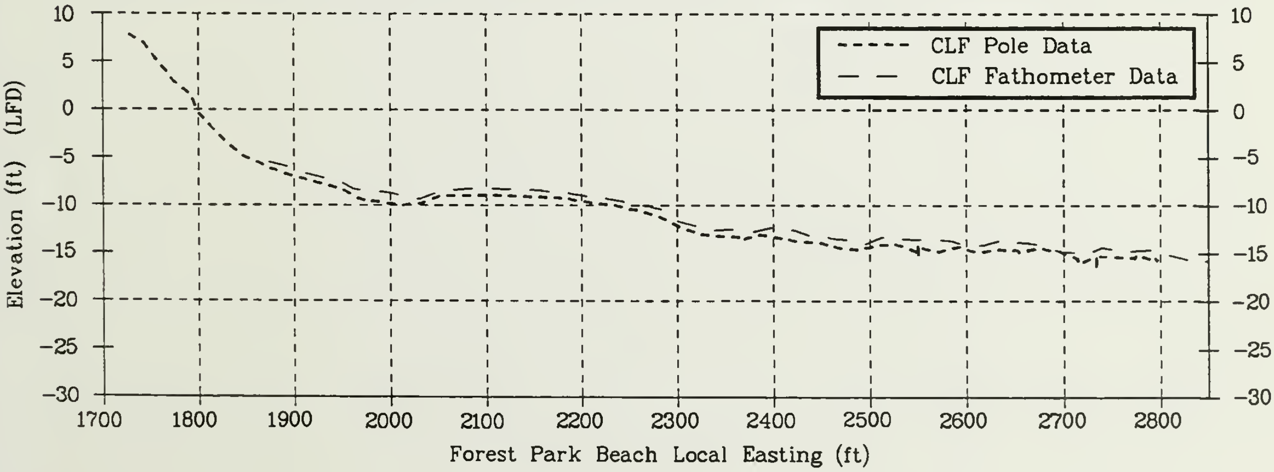
N 4867 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



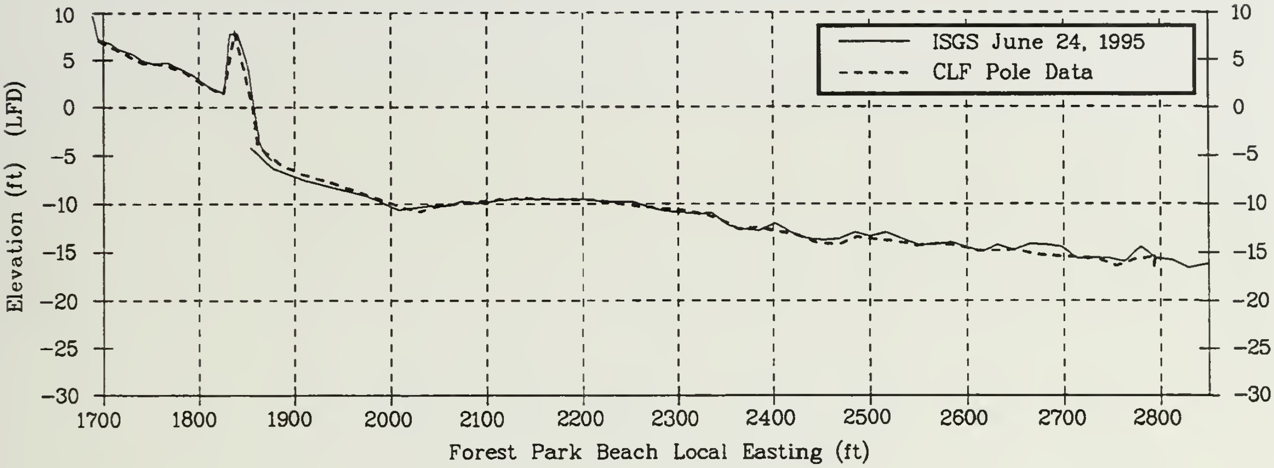
N 4867 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



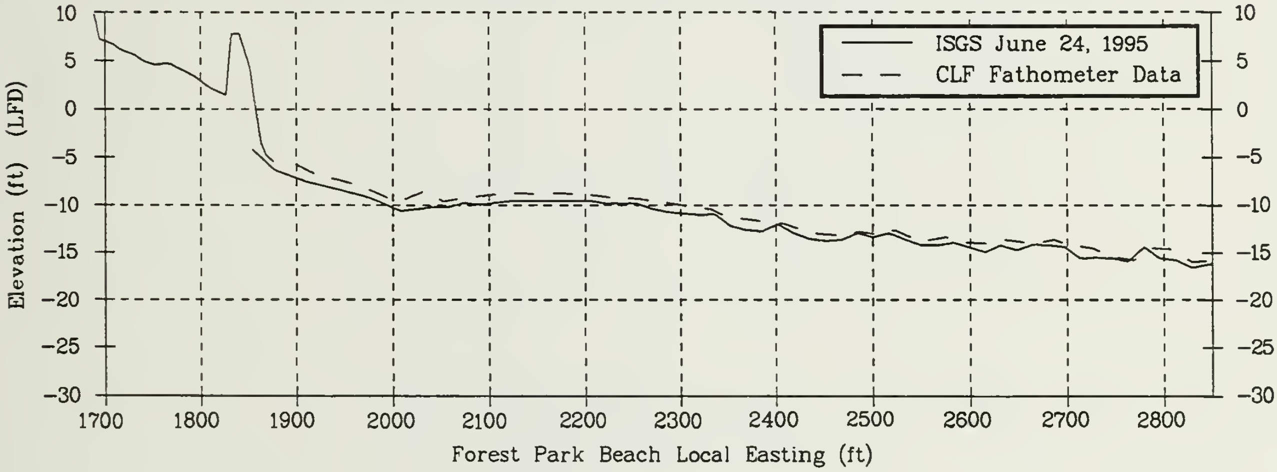
N 4867 Comparison of City of Lake Forest Pole and Fathometer Surveys



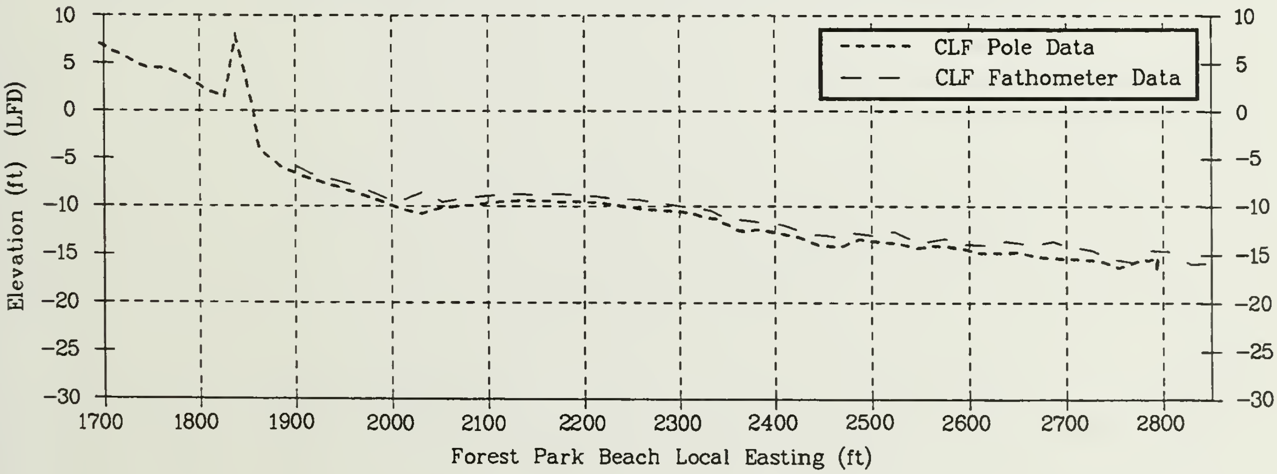
N 4667   Comparison of ISGS and City of Lake Forest 1995 Short Profiles



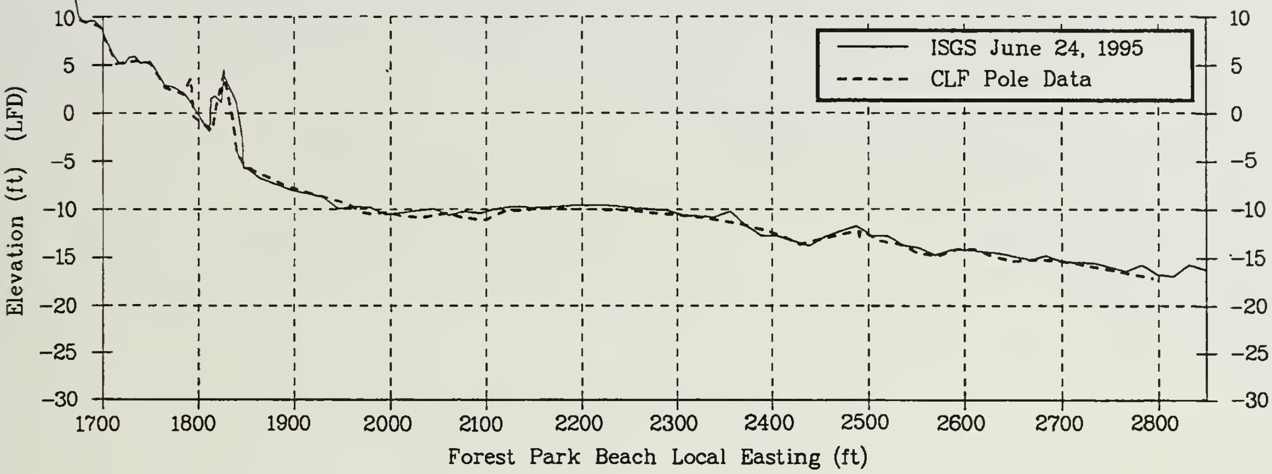
N 4667   Comparison of ISGS and City of Lake Forest 1995 Short Profiles



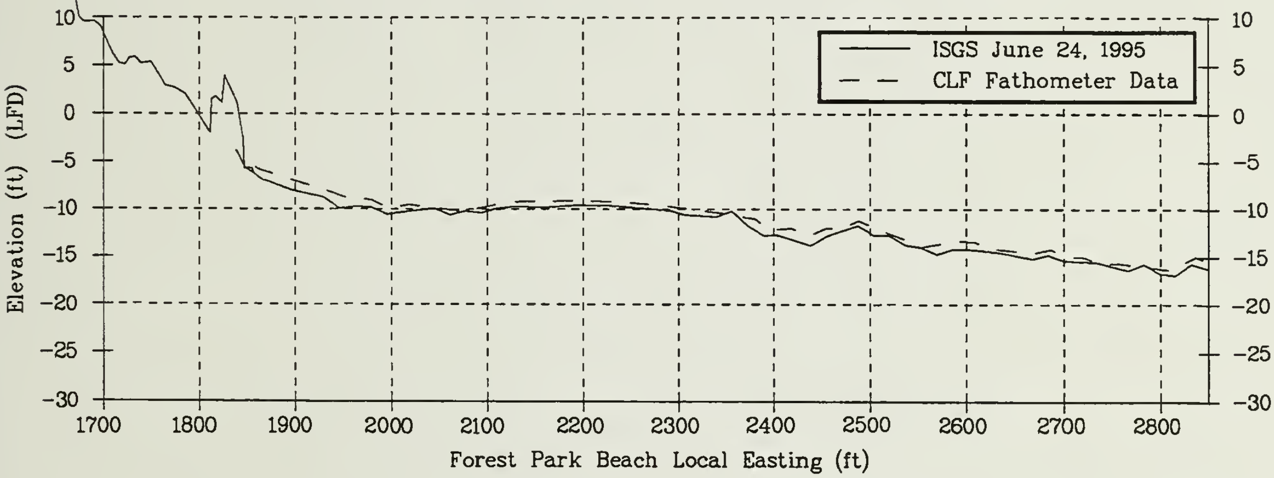
N 4667   Comparison of City of Lake Forest Pole and Fathometer Surveys



N 4467 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



N 4467 Comparison of ISGS and City of Lake Forest 1995 Short Profiles



N 4467 Comparison of City of Lake Forest Pole and Fathometer Surveys